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Natural Resources of

NORTH DAKOTA

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Natural Resources of North Dakota

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The purpose of this booklet is to bring a new awareness on the part of the American people of our rich natural resource heritage, its history, its present, and its future. To know our land is to love it and cherish it and protect it from the ravages both of nature and man.

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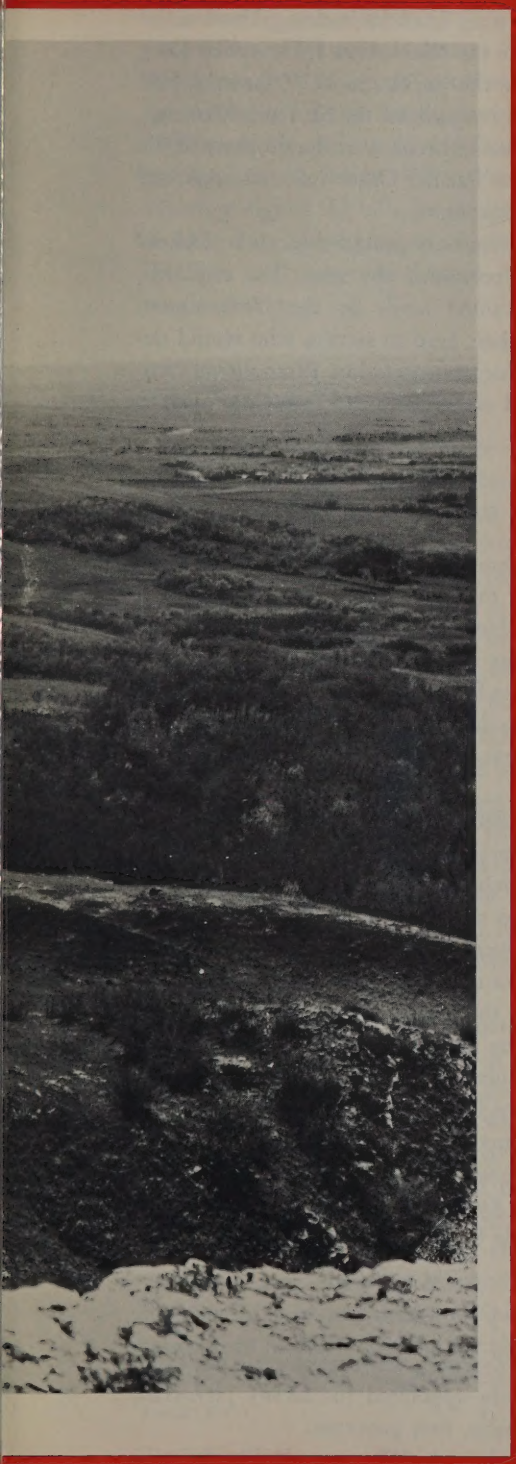
Though the world may seem overcrowded, solitude can still be found in Theodore Roosevelt Memorial Park.



Introduction

When agricultural settlers first came to North Dakota, they discovered that they had to adjust to a new type of environment. Often settlers came from areas which were humid to live in a land which was relatively dry. The sparsely populated territory encouraged self-reliance; the worth of the individual was apparent.

This land could shape a man. But many, who couldn't stand the hardships created by drought, grasshopper or locust plagues, and the isolation of the rural areas, soon left.

Those who chose to remain were a hardy breed of men. Theodore Roosevelt, who first saw North Dakota in 1883, said that without the experience which he gained while ranching here, he could never have been President. Today, the experience of living in North Dakota has created a population which is encouraging the growth of industry while affirming its frontier heritage.

Early History

In 1682, Sieur de la Salle claimed all the lands drained by the Mississippi River in the name of the King of France. This, theoretically, meant that more than half of North Dakota became a French possession. Another Frenchman, Pierre Gaultier de Varennes, Sieur de la Verendrye, who was searching for an overland route to the Western Sea, was the first European known to have entered North Dakota. The King of France had given Verendrye a monopoly on the fur trade to support his western explorations. Verendrye, who encountered Cree, Assiniboine, and Mandan tribes during his journeys, made the first written record of the Indians of North Dakota.

Several decades elapsed until, in 1797, the next important explorations were made by David Thompson, an English geographer. In the same year, Charles Chaboillez, a fur trader, established a North West Company post at Pembina. Soon the XY and Hudson's Bay Companies also had established posts in the region.

Perhaps the most renowned explorers of the area were Lewis and Clark, who traveled up the Missouri River in 1804–5 and wintered near a Mandan Indian village. They hired a French interpreter, Charbonneau, and his Shoshone wife, Sakakawea, who accompanied them to the West Coast. Sakakawea's assistance was valuable when the expedition traveled through Shoshone territory.

Lewis and Clark attempted to establish the authority of the United States over this region; however, as long as the Indians depended on British fur traders, it was the traders who really controlled the area.

Fur Trading

The Indians came to depend on the fur trader for guns, kettles, knives, fishhooks, axes and other items superior to Indian equipment which were exchanged for furs; the trader discovered that liquor could give him an advantage in his dealings with the Indians. At some posts, liquor flowed freely. Alexander Henry, a partner in the North West Fur Company, reports in his journal: "Feb. 9, 1806. Men and women have been drinking a match for three days and nights during which it has been drink, fight—drink, fight—drink, and fight again—guns, axes, and knives their weapons—very disagreeable."

Fur traders were not anxious to have the area settled and they helped make life miserable for the Selkirk settlers, a group which attempted to live at Pembina in 1812.

The heyday of the fur trader ended when the beaver hat went out of style. The fur trader was followed by the gold seeker.

Gold was discovered in Montana in 1863 and 1864, and prospectors found the Missouri River was the best means for penetrating the area. Gold dust was floated down the river, through North Dakota, on its way to St. Louis. The discovery of gold in Montana also led to increased land traffic across North Dakota.

Railroads

Perhaps the biggest boon to settlement was the establishment of railroads. In 1864, the Northern Pacific Railway received a charter from the Government. Though the railroad was granted 24 percent of the land which was to become North Dakota, it had difficulty getting financial backing. However, it was completed to the Missouri in 1873, and by 1883, the road reached the Pacific. In 1879, James J. Hill and his associates organized the St. Paul, Minneapolis and Manitoba and took over the property of the old St. Paul and Pacific. Other railroads also laid lines in North Dakota.

The railroads not only provided access to Dakota Territory, they promoted the area. The railroads, which were granted lands by the Government, wanted to sell their land to settlers who would depend on trains for transportation. Promotional campaigns extended not only to the East Coast, but to Europe as well.

Great Dakota Boom

With the construction of the railroads and the growth of flour milling industry in Minneapolis, a boom came to North Dakota. Settlers rushed into the area building sod shanties in the midst of the prairies. Bonanza farms began to be seen; from 1878 to 1890 the population of North Dakota increased by 1,000 percent, from an estimated 16,000 to 191,000.

By the late 1880's, Dakota Territory was second only to Minnesota in wheat production. Farms, towns, papers, schools, churches—all grew rapidly. But, perhaps too much growth had taken place too rapidly. There were more banks, schools, and stores in North Dakota than the land could support.

Surveyors for the railroads, gold panners, and settlers aroused the anger of the Indian whose land was being intruded upon. Skirmishes between settlers and Indians became a problem. To protect the settlers, the Army built forts, perhaps the most famous of which was Fort Abraham Lincoln, from which General George A. Custer marched on his way to the Little Bighorn in Montana.

From Territory to State

The Dakota Territory was organized in 1861 and President Lincoln appointed his family physician, Dr. William Jayne, first governor.

The spirit of the wild West prevailed in the politics of the territory. Electioneering was a noisy affair. A candidate making a speech was likely to be heckled by the opposition, and heckling included such sports as shooting the candidate's hat off. Cities

vied to become the capital, an honor eventually won by Bismarck through a bit of political maneuvering by the Northern Pacific. (The Northern Pacific's main line lay at Bismarck.)

Differences between Dakotans caused problems. Finally, in 1889, Congress passed an act allowing for the admission of two States. And on November 2, 1889, both North Dakota and South Dakota were admitted to the Union. When President Benjamin Harrison signed the bills, he covered the documents so that only the signature blocks were showing. Thus, it will never be known which State was admitted first.

Two Badlands' Personalities

Two celebrated personalities of North Dakota—the Marquis de Mores and Theodore Roosevelt—lived in the Badlands.

De Mores came to North Dakota in 1883 with the idea of building a packing plant to avoid the expense of shipping live animals to slaughterhouses in the east. He named the town he founded for his wife, Medora, and built a 28-room château there. His packing plant, one of several of his business enterprises in North Dakota, cost $250,000. Though the plant had modern equipment, de Mores lost money on the venture. Furthermore, some of his neighbors did not accept him because they felt that his claims to nobility were not in keeping with democracy; de Mores, though finally acquitted of the charges, was accused of killing a man. In 1886, he and his family returned to Europe, shutting down château and packing plant.

Theodore Roosevelt came to Medora for his health. In 1884, he wrote, "The country is growing on me, more and more; it has a curious fantastic beauty of its own." Later he stated, "We worked under the scorching midsummer sun, when the wide plains shimmered and wavered in the heat . . . In the soft springtime the stars were glorious in our eyes each night before we fell asleep; and in the winter we rode through blinding blizzards . . . ours was the glory of work and the joy of living." Roosevelt's experiences in North Dakota greatly influenced his decisions when faced with conservation challenges of a later day.

Education

As communities in North Dakota began to grow, the necessity for schools became apparent. Often schools were established on an informal basis. A mother would open a school in her home for the neighborhood children or itinerant teachers would hold classes in the tent cities that sprang up along the railroad.

By 1883, two institutions for higher education had been established—Jamestown College, a church-supported school, and the University of North Dakota at Grand Forks. The University of North Dakota was originally established as a liberal arts college, however, it soon expanded into a law school, college of mechanical engineering, and school of mines.

Today the University of North Dakota, as well as the other State schools, provides for the varied educational needs of North Dakota's citizens. Research has become increasingly important at these schools. For example, an interdisciplinary study on the impact of the new oil industry on the Williston Basin has been completed at the University of North Dakota. This study involved work of the economics, geography, political science, and sociology departments.

Numerous research projects on the use of agricultural products for industry and industrial products for agriculture are being conducted at the North Dakota State University of Agriculture and Applied Science. These projects provide information which directly benefits many people in North Dakota, and the Nation as a whole.

Politics in the Flickertail State

During the early part of this century politics in North Dakota did not follow normal partisan lines. In 1915, the Nonpartisan League was formed in this State, traditionally considered Republican. The League was a reaction by the people of North Dakota to things being run by "Easterners." Farmers complained of unfair methods of docking and grading grains, activities which were controlled by out-of-State people. The program, which called for State ownership of terminal elevators, flour mills, packing houses and cold storage plants, and State inspection of grain and grain dockage, among other things, gained support rapidly. Before the end of its first year, the League had 30,000 members. Three governors from the League were elected.

Today the political independence which led to the growth of the Nonpartisan League still marks the North Dakotan.

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Today and Tomorrow

The trend in North Dakota, as in other rural areas of the Nation, has been for small farms to be consolidated. And, as in other States, the farm population is decreasing, and people are moving to the cities looking for jobs. However, the cities cannot provide enough jobs for the influx of workers.

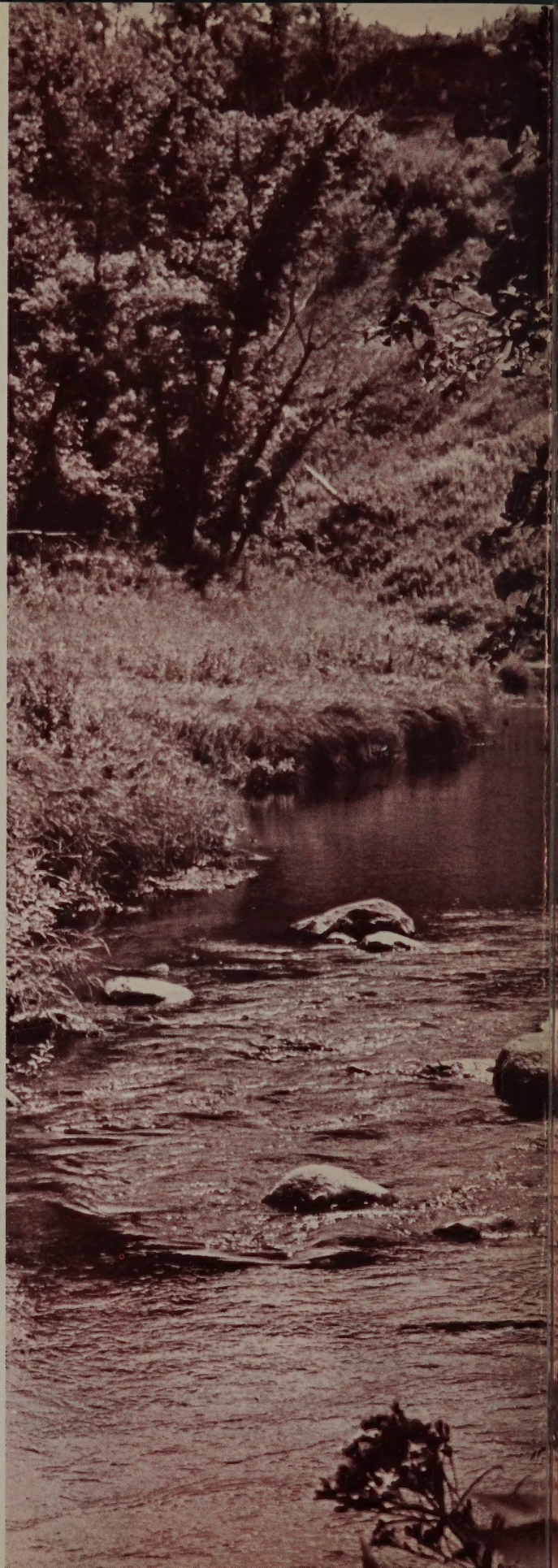
To combat these problems, the Flickertail State is actively trying to encourage the introduction of new industry.

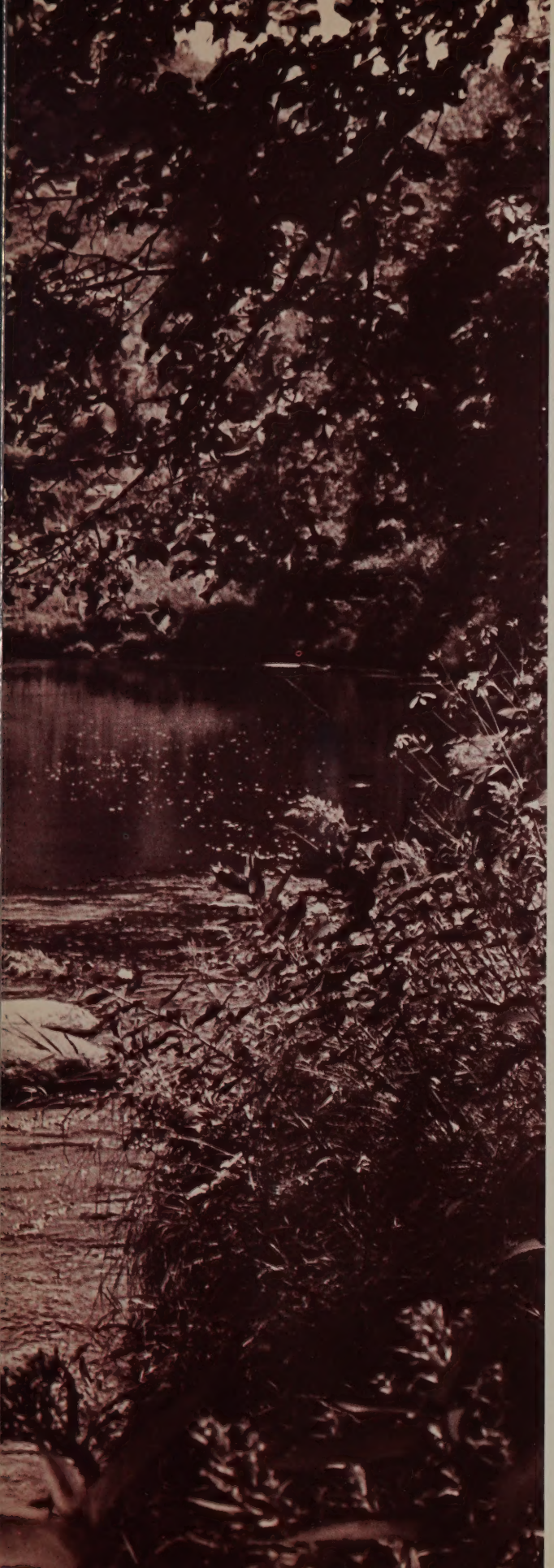
From 1954 to 1964, North Dakota ranked third in industrial growth rate increase in the United States. Because of the abundance of raw materials and the availability of labor, the State is more than able to support future industrial growth.

In recent years, mineral production has skyrocketed, and the coming years hold more growth, especially as new uses for North Dakota's vast supply of lignite coal are found. Oil, discovered in 1951, was a most important addition to the development of North Dakota's natural resources. Salt was first mined in 1960; and uranium has been discovered in beds of lignite coal.

Commercial fishery stocks are significant, but underharvested. Potentially, many more commercial fishermen could be employed.

North Dakotans have definite ideas about the future. The people will not sacrifice their pioneering spirit in the name of progress. Rather, they are looking forward to a future in which the basic quality of a rural society will be maintained and the benefits of growing industry will be realized.





Physical Characteristics

North Dakota is predominately a land of prairies and plains 1,000 to 3,000 feet above sea level. Almost rectangular, it is 17th in size among the States and encompasses more than 70,000 square miles—over 45 million acres—bounded by Canada, Montana, South Dakota, and Minnesota. The geographic center of North America is located in Pierce County.

All but the southwestern corner and the eastern edge of the State is rolling fertile prairie dotted by thousands of small lakes, ponds, and potholes. The area was covered by glaciers in the Great Ice Age. This vast grass-covered flatland slopes gently eastward, interrupted here and there by rounded hills and plateaus and a few low mountain masses, such as the Turtle Mountains near the Canadian border. Long escarpments, such as the eastern face of the Pembina Mountains and the Coteau du Missouri extend south and southeastward across the State, and separate the prairies into several erosional levels or steps.

The eastern edge of North Dakota is especially flat. This part of the State was covered by glacial Lake Agassiz, which extended far to the north into Canada and east into Minnesota. The lake, formed by melting glaciers about 10,000 years ago, was the largest fresh-water lake in the world. Another large, flat area formed as the result of a glacial lake, Lake Souris, occupies the north-central part of the State.

The plains of the southwest corner of North Dakota have been sculptured in many places by streams and the wind into spectacularly steep-sided, flat-topped badlands; this is the highest part of the State, much of it more than 3,000 feet above the sea.

The Forest River is one of many streams which lures the outdoors enthusiast to North Dakota.

Rivers of North Dakota

North Dakota lies in two major drainage basins. Approximately 59 percent of the State's area drains into the Missouri River, which ultimately wends its way into the Mississippi River and the Gulf of Mexico. Forty-one percent eventually drains into the Hudson Bay in Canada by way of the Souris and Red Rivers and their tributaries.

Principal western tributary streams of the Missouri River in North Dakota are the Little Missouri, Knife, Heart, and Cannonball Rivers. The James River, another tributary of the Missouri, has its headwaters in central North Dakota and leaves the State in the southeastern section.

Both the Souris and Pembina Rivers have headwaters in Canada; the Souris, flowing southward into the State, reverses direction and flows back into Canada. The Pembina River enters the Red River at the extreme northeastern corner of the State.

Headwaters of the Sheyenne River, the largest tributary to the Red in the State, are located in central North Dakota. From this region, the Sheyenne flows generally southward, but makes a large loop to the north in the southeastern part of the State and enters the Red River near Fargo.

In north-central North Dakota, the Devils Lake Basin is generally considered a part of the Red River drainage.

Geologic History

Deposits left by glaciers and their meltwaters cover most of the State, concealing the rocks and landscape over which the glaciers crept. Nevertheless, it is possible to reconstruct the geologic history of North Dakota for more than a billion years before the glaciers came, due to the rocks exposed in southwestern North Dakota, an area never reached by the glaciers, and rock fragments and drill cores brought up in the thousands of oil, gas, and water wells.

The oldest rocks beneath North Dakota began as thick sediments—layers of clay, sand, and mud—that built up on the floor of the ocean over millions of years. The sediments gradually hardened into shale, sandstone, and limestone. Then, about a billion years ago, they were transformed by pressure and heat into hard crystalline rocks—schist, gneiss, and marble. These ancient rocks were raised above the sea and eroded by streams, winds, and ocean waves, until they were worn down to a smooth surface.

About 500 million years ago, North Dakota again sank beneath the sea and remained submerged for most of the next 430 million years. Again, a thick layer of sediments accumulated and hardened into limestone, sandstone, and shale. The sea floor sank as the sediments accumulated. The water which was never more than a few hundred feet deep was alive with a wonderful variety of marine plants and animals, some of whose remains decayed to form oil that became trapped within the rocks. The sea floor did not sink at the same rate everywhere; sinking was greatest below what is now the Killdeer Mountains, south of the Missouri River near the Montana border, where more than 3 miles of rock eventually accumulated, forming the gigantic Williston Basin which underlies 200,000 square miles of the United States and Canada.

The Williston Basin stopped sinking about 135 million years ago, and the region remained under an inland sea until 80 million years ago. Then, for 15 or 20 million years, the sea retreated and advanced over North Dakota several times. Each time the sea retreated, the area became a forested swamp; dead trees and other plants accumulated, were buried, and later became soft coal. About 60 million years ago, the land again rose and the sea retreated; the land was nearly as flat as it is today. The area was slowly worn down by sluggish streams that meandered northward to the sea.

About a million years ago, a great ice sheet inched southward from Canada, across North Dakota and far to the south, levelling the landscape and mantling the rocks with clay and boulders. After many thousands of years, it melted away. Still later advances of ice also left their deposits. Now, long looping ridges of chaotically mixed clay, silt, sand, and boulders mark the farthest advance of each ice sheet and also where the retreating ice front stood still for long periods. As the ice front retreated, meltwaters were trapped to form shallow lakes. Here and there, meltwater streams flowed, depositing clean sand and gravel in their channels or in broad aprons.

At least five ice sheets entered the State, and all but the southwest corner was covered by ice at least once; the last glacier retreated into Canada about 12,000 years ago. The glaciers destroyed the old stream patterns, so that all the streams and rivers of today, even the great Missouri River, have been flowing in their present courses only several thousand years, since the glaciers left.

The vast Williston Basin is the source of North Dakota's most valuable mineral product—oil; in

areas where there were swamps 60 to 80 million years ago, there are important reserves of lignite coal. Buried preglacial stream channels provide water for drinking and irrigation. Sand and gravel, deposited by glacial meltwater streams and near the shores of glacial lakes, supply construction material. Some lake basins left from glacial times contain valuable deposits of sodium sulfate. The fine, weathered debris laid down by the glaciers themselves and in glacial lakes and outwash plains, has become the fertile soil that supports the State's main industry—farming.

Climate

Weather in the Flickertail State varies greatly from summer to winter and sometimes from day to day. Because of its position within the continent, the State has what has been termed a continental climate.

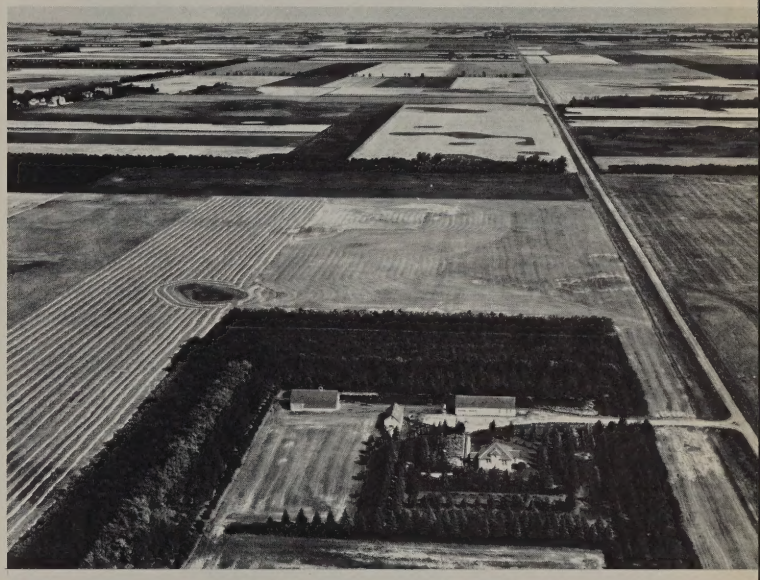
Summers are generally pleasant. However, temperatures of over 100° F. are occasionally recorded. The nights are cool and therefore comfortable. In the afternoon, when temperatures reach their peak, the humidity is frequently low; the heat is not felt as it would be in a more humid area.

Winters in North Dakota are cold, and zero readings are quite common. On an average, 53 days per year the temperature is zero or lower.

Precipitation in the eastern third of the State averages about 19 inches; in the central third, 16 inches; and in the western third, about 15 inches. Almost 50 percent of the annual precipitation falls during May, June, and July. Thunderstorms are frequent and rain normally falls about one day in four during the summer months. The average annual snowfall is 32 inches with the greatest amount in the northeast and the least in the southwest.

From the middle of May to the end of July the the sun shines for more than 15 hours on a clear day. These long hours of sunshine make it possible for many crops to be grown in a comparatively short growing season (121 days).

Peaceful Valley and the Little Missouri River can be seen from this overlook in the Badlands.



The eastern edge of North Dakota, which was once covered by glacial Lake Agassiz, is quite flat.

Field windbreaks protect soil during dust storms and help collect moisture from snow drifts.

In outlook as well as dress, Indians today are a mixture of both the old and the new. They maintain links with the past while affirming their belief in the future.

Indian Heritage

North Dakota is the home of five Indian tribes: the Sioux, the Turtle Mountain Band of Chippewas, the Hidatsa, the Arikara, and the Mandan Tribes.

The leading role in shaping the history and character of the Dakotas before Europeans came was played by the Sioux, or Dakota Indians, for whom the two States were named. The word Dakota (or the variations Lakota and Nakota) means "allies." Long before the Sioux migrated to the Dakotas from the east, three tribes had settled in villages along the Missouri River. They were the Mandans, the Arikara or Ree Indians, and the Hidatsa or Gros Ventres.

The Mandans, an agricultural tribe, are best known through reports of the Lewis and Clark expedition. Their origin is uncertain, although it is believed that they moved from the area that is now South Dakota.

Another agricultural tribe, the Arikaras, settled farther south along the Missouri. A Caddoan-language group originally from what is now Nebraska, the Arikaras were driven north about 1750 by an invading band of western Sioux.

Farther northeast, the Hidatsas or Gros Ventres, a Siouan language group, had established an agricultural life near Devils Lake, within the area of the present Fort Totten Reservation of North Dakota. Sometime in the 18th century, pushed by the Sioux, the Hidatsas moved across the prairies to the junction of the Heart and Missouri Rivers.

All three groups were greatly reduced in numbers by the smallpox epidemic of 1837 which swept up the Missouri and over the plains, killing thousands of Indians. In 1870, survivors of the Mandans, Arikaras, and Hidatsas were placed on the Fort Berthold Reservation at the junction of the Missouri and Little Missouri Rivers of North Dakota. The reservation is still the home of the three affiliated tribes.

At varying intervals, other groups of Indians drifted west across the Dakotas. Among these were the Cheyennes, who were an agricultural tribe during their early Dakota residence. Later, after many years during which they were attacked and pursued by the Chippewas and the Sioux, the Cheyennes adopted a horse-and-buffalo way of life, becoming one of the most fierce and warlike of Northern Plains tribes. Crows, Omahas, and Assiniboines stopped briefly in the Dakotas, but were driven out by the Sioux.

The Chippewas

Members of the Algonquian linguistic family, and once the most numerous tribe north of Mexico, the Chippewa (Ojibway) Indians began moving west during the white settlement of eastern North America. They spread into Ontario, Canada, and the whole Great Lakes region, and finally fanned into Sioux areas to the west, pushing the Sioux southward in fierce conflicts over the rich hunting grounds in Minnesota.

Moving south, they tended to break up into more or less independent groups. For a century or more before the establishment of the international boundary between Canada and the United States, the Plains Chippewas wandered freely throughout the area, mingling with the Crees, a group related in language and culture.

As hunting, trapping, and lumbering diminished and agriculture became the dominant activity of the area, the Chippewas were left somewhat stranded. Many of them settled in the Turtle Mountains of North Dakota, close to the Canadian border, and roamed an area that extended south to Devils Lake and westward from the Pembina range into what is now Montana.

The southern boundary, and to some extent the western boundary of lands claimed by the Chippewas, remained undisputed until about 1880. Their overlap into Canada created international complications for a time.

Congress in 1873 appropriated $25,000 for the purchase of a township on the White Earth Reservation in Minnesota as a home for the Turtle Mountain Indians, with an additional $10,000 provided to pay for the cost of the move. Most of the Turtle Mountain Indians (Pembina Band) refused to leave their North Dakota location, however.

Under an agreement negotiated in 1892 and approved by Congress in 1904, the Turtle Mountain Band ceded claims to all territory except two townships within the Turtle Mountain area. They received a cash payment of $1 million for the 9 million acres ceded. The agreement provided for the allotment of lands on the reservation and for public domain land grants to tribal members unable to secure land within the designated reservation.

The Turtle Mountain Chippewas still remain on these lands today, governing themselves through an elected 9-member council under a constitution approved in 1959.

The Sioux

The Sioux were not native to the Dakotas but came from an area farther east. They have been identified in the public mind with Indian life in the Dakotas, largely because they were in the path of white migration and resisted the encroachments of the white man.

The bison, or buffalo, was basic to the Sioux economy, providing food, clothing, shelter, and an amazing variety of tools and equipment, as well as sacred objects for ceremonial use.

Acquiring horses—often stolen in raids—the Sioux became more mobile. Large groups, sometimes composed of several bands, were able to travel hundreds of miles during the summer chase, carrying with them their shelters—tepees of animal hide.

Coming of Settlers

With discovery of gold in California during the late 1840's, waves of prospectors and would-be business entrepreneurs swarmed over the plains en route to the west. Some stopped along the way, and Army troops were assigned to patrol the region. The Plains Indian wars began in earnest.

After a Sioux victory over General George C. Crook at the Battle of the Rosebud, the Army realized that defeating the Indians was a bigger undertaking than expected. New tactics were planned and the 7th Cavalry under General George A. Custer was sent to find the Indians' encampment.

The Battle of the Little Bighorn was the last great Sioux victory. Scattering throughout the country after their triumph, the Indians were run down and defeated, band by band, by U.S. Army forces.

Confined to reservations, unable to hunt or fight, betrayed by broken treaties and forbidden by the Government to seek supernatural help through the Sun Dance, the despairing Sioux turned to a new cult, the Ghost Dance. Started by a Paiute prophet who claimed to have received a message from the Great Spirit, the Ghost Dance spread through the reservations.

The new religion called for dances and songs which would hasten the return of the buffalo, the arising of Indian dead, and the disappearance of the settlers. It was harmless in that it promised these things by supernatural means and did not call for violence, but settlers feared it was a preparation for new Indian hostilities.

Late in December 1890 near Wounded Knee Creek in South Dakota, troops of the 7th Cavalry

intercepted a group of Sioux and ordered them to surrender their arms. After the Sioux had made camp and begun giving up their weapons, an accidental rifle shot triggered a general panic and the soldiers began firing at the Indians, killing women and children as well as warriors. After the massacre at Wounded Knee, the remaining Sioux bands surrendered, and their overt opposition to settlement ended.

Indian Life in North Dakota Today

Both the Bureau of Indian Affairs and tribal governments are increasing their roles in the development and management of reservation resources in an effort to improve the economic and social levels of Indians in North Dakota today.

Many of today's reservations offer Head Start programs for preschoolers, earn-and-learn programs for high school students, and work experience programs for unemployed, unskilled adults.

The Bureau of Indian Affairs along with the tribal governments is trying to encourage resource development to boost tribal economies. Oil has been produced on the Fort Berthold Reservation; extensive deposits of lignite may prove valuable in the future.

Members of the Turtle Mountain Band of Chippewa have proved quite adept at the making of precision jewel bearings, an industry located at Rolla, N. Dak.

Bringing in the harvest.

Land and Forests

Settlers coming to North Dakota were greeted by a "sea of grass" which extended over most of the State. Many early homesteaders who came from areas which were well-forested chose to live in the rich prairies of the river valley regions where there was timber for fuel, fenceposts, homes, and farm buildings.

The bonanza farms established in the late 19th century, served as spectacular advertisements which attested to the wealth of the Red River Valley. Tales of bumper crops spread, bringing settlers who wished to see if the stories were true.

Wheat was the crop grown on bonanza farms; North Dakota soon became a leader in this field—a vital part of the American "breadbasket."

Agriculture

Today over 90 percent of the land in the State is in farms. Following a national trend, the size of farms has been growing while the number of farms has been decreasing. The average size farm is 875 acres; in 1933, it was 462 acres. In 1933, there were approximately 86,000 farms in North Dakota; in 1966, 48,000.

Recent years have brought record-breaking crops to North Dakota. Cash farm receipts in 1965 were $805 million, making North Dakota 20th in this respect in the United States. Income from crops was $464 million or 11th in the Nation.

Wheat is grown in every county and is undoubtedly the most important crop. Hard red spring wheat grown in North Dakota consistently demands premium prices from millers and is used in high quality breads.

Durum wheat is grown in abundance. In fact, 80 percent of the country's entire acreage in durum wheat is in North Dakota.

Spring barley is used in making beer and for high protein animal feeds.

Approximately 50 percent of the flax produced in the United States is grown in North Dakota. Flax is particularly important because it fits into the crop rotation system and produces a good monetary return. Oil extracted from flax is used in foods, paints, and as a livestock protein supplement.

Winter rye, soybeans, potatoes, and sugar beets are other important crops raised in North Dakota.

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Over 90 percent of the land in North Dakota is in farms. Some of the leading crops are wheat, rye, barley, and flax.

Up-to-date farming techniques and equipment have meant growth in production. For example, in 1915, farmers planted 9,370,000 acres of wheat and gleaned 159,290,000 bushels. In 1965, 179,706,000 bushels were harvested from 6,786,000 acres.

Irrigation units promise to increase the yield on many acres. North Dakota gave up many good acres of farmland for the creation of the Garrison Diversion Project, but will soon be reaping some benefits from this project. Irrigation should lead to greater crop diversification.

In the past, beef cattle, an important source of income, were raised in the western part of the State and sent to the east to be fattened. But, it is felt that in the future, cattle feeding in western North Dakota will increase and crops, such as barley, will be the basis for the growth of this industry.

Sheep, poultry, and swine are among the other livestock raised on smaller, diversified farms.

Forest Lands

Settlers found that although North Dakota was a vast "sea of grass," there were enough trees along streams and rivers to provide wood for their immediate needs. Native timber also was used for the ties for the railroad and for fuel for steamboats that traveled North Dakota's rivers.

The Federal Government, through the Timber Culture Act of 1873, tried to encourage the planting of trees. However, often early plantings were unsuccessful because of inadequate knowledge of how to plant and care for trees or because of climatic and soil conditions. Moreover, settlers clearing land for farming caused a drop in the number of acres of trees in the State.

Today, though forests in North Dakota cannot maintain large industry, they do supply wood for fenceposts and fuelwood. Some wood is shipped out of the State for furniture stock. The forests supply some protection from erosion and floods, shelter wildlife, and provide areas for recreation.

Heavier wooded areas in the State include the Turtle Mountains, Devils Lake, Pembina Hills, and areas along the Missouri, Red, and Sheyenne Rivers.

Along the Sheyenne and Red Rivers, basswood, American elm, bur oak, green ash, cottonwood, and hackberry grow well. Almost all of the timber land in this portion of the State is in private ownership.

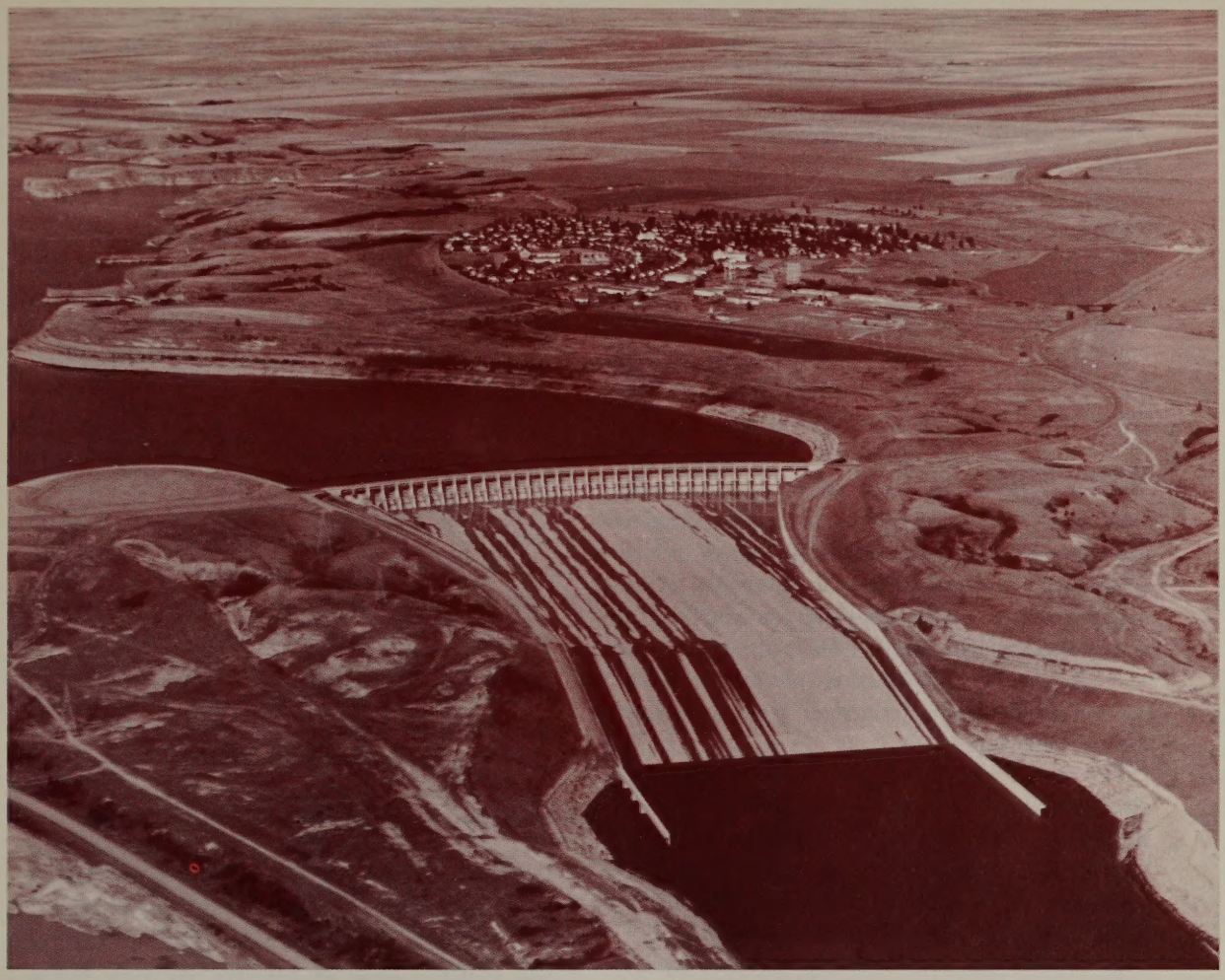
Large areas of cottonwood stands are found along the Missouri River between Oahe Reservoir and Lake Sakakawea and above Lake Sakakawea. At one time there were 146,700 acres of cottonwood along the Missouri River, but, because of the two dams, there is about 43,700 acres. As more and more clearing is done for agriculture, made possible by the stabilization of the river by Garrison Dam, the number of acres of cottonwood will continue to decrease.

In the Turtle Mountains, as along the Missouri River, clearing of lands for farming has caused a reduction in the number of acres of forest land. However, stands of aspen, birch, and oak are still found in large blocks.

The Devils Lake area is forested in oak and ash. Many acres of this land are in the Fort Totten Indian Reservation.

Both Ponderosa pine and Limber pine are found in the Badlands. This is the only area of native pine in the State. Rocky Mountain juniper is also found in the Badlands.

There are four tree seedling nurseries in the State—two owned by Soil Conservation Districts and two owned by the North Dakota Forest Service.



Garrison Dam and Lake Sakakawea provide flood protection not only for North Dakota, but for all of the Missouri River Valley.

Water and Power

The people of North Dakota have been affected greatly by the State's water resources. This is evident from the earliest recorded history. Journals of the Lewis and Clark expedition reveal that the Mandan Indians, an agricultural tribe, relied on river bottom lands and nearby water to insure a harvest. Small trading centers developed along watercourses; riverboat transportation—especially on the Missouri River—provided access to lands in North Dakota as well as Montana.

This precious liquid—or the lack of it—was constantly in the minds of adventurous western land developers. Due to the ever-changing weather pattern, they well realized that the only real hope of water resource development was to be found in the Missouri, the longest river in the United States, which flowed into the State from western mountain and plateau regions.

The State Constitution now provides: "All flowing streams and natural water courses shall forever remain the property of the State for mining, irrigation, and manufacturing purposes."

Water Availability

North Dakota water resources include both surface and underground supplies. Large quantities of water are available in the major streams and groundwater reservoirs of North Dakota. However, the supply is unevenly distributed with respect to time, location, and quality. As a result, numerous problems arise when attempts are made to obtain the right quantity and quality of water at the right place, at the right time, to satisfy specific needs. These problems are usually local in nature, but they tend to inhibit the development of the State and prevent the efficient utilization of available water.

Surface Water

Of the 17 inches average annual precipitation, it has been estimated that three-quarters of an inch—or about 2½ billion gallons a day—escapes to the major drainage system. This average runoff, plus waters flowing into North Dakota through interstate and international rivers, less the amount flowing out of the State, constitutes the manageable surface water supply.

The annual runoff in any river basin varies widely and may range from a small fraction of an inch to several inches. The Missouri River is North Dakota's largest source of water; most of its flow is derived from melting snow in its mountainous headwaters. The flow of the Missouri River is controlled to a large extent by reservoirs. During the last 20 years the average flow in the Missouri River near Williston, just below the mouth of the Yellowstone River, was about 22,000 cubic feet per second. Enough water flows past this point each year to cover North Dakota to a depth of 4 inches.

Flows of other streams in the State vary widely from month to month, but usually most of the runoff occurs during the snowmelt months in the spring. Usually from 60 to 80 percent of the annual runoff in the tributary basins takes place in a few weeks during and immediately following the snowmelt period.

Except for the Missouri River, Red River, and lower reaches of the Sheyenne River, all streams in the State have been dry during long droughts. Storage reservoirs are usually required to develop dependable supplies on the tributary streams.

The thousands of small lakes or ponds, called "potholes," in the central part of North Dakota provide water for stock watering, recharge to underlying ground-water reservoirs, and duck habitat.

While there is no official compact on sharing of the Missouri River waters, sharing as noted in the federally approved Missouri River Basin plan, enacted in the Flood Control Act of 1944, is expected to continue to be of value. International agreements on streamflows are in effect with the Canadian Government.

Underground Supplies

Ground water is the principal source of supply for most municipalities and farms in North Dakota; however, most large municipalities, such as Fargo, Grand Forks, and Bismarck depend on surface water. In recent years there has been a growing demand for ground water to be used for irrigation. Irrigation wells producing several hundred to more than a thousand gallons per minute have been constructed in many of the counties in the State. The success of these irrigation developments will undoubtedly stimulate drilling of other irrigation wells.

Although North Dakota's ground-water resources are substantial, development has been small in comparison to the potential. Proper ground-water development should make a substantial contribution to the economic growth of the State.

Water Development

Leaders in water development have recorded many accomplishments in North Dakota and cooperative efforts with other States have been undertaken. As early as 1902, Senator Hansboro from North Dakota co-sponsored water development legislation subsequently enacted and known as the Reclamation Act.

North Dakota, realizing that major river diversion seemed beyond the financial capacity of the residents, established other programs providing for the systematic development of water resources. A set of water laws was enacted which has served as a guide to other Western States, and a water commission was established. In 1955, a model Conservancy District Act to accommodate the million-acre Garrison Diversion Unit was passed by the North Dakota Legislature.

During recent years, much has been accomplished to assure adequate water supplies, not only for present requirements, but for the increasing needs of the future.

Missouri River water, now stored in main-stem reservoirs constructed under the Missouri River Basin Project, is available in great quantities for multiple uses in the basin-wide plan of development. In central North Dakota, Garrison Dam and its

reservoir, Lake Sakakawea, which has a total storage capacity of 24.5 million acre-feet, have been completed. Oahe Reservoir in South Dakota, with a reservoir pool extending as far north as Bismarck, has a gross storage capacity of 23.6 million acre-feet. These storage reservoirs, developed by the U.S. Army Corps of Engineers, provide water for irrigation, hydropower generation, and navigation in downstream areas, among other uses.

Other notable storage reservoirs include those formed by Dickinson and Heart Butte Dams on the Heart River and Jamestown Dam on the James River — built by the Bureau of Reclamation.

Storage in Lake Ashtabula (behind Baldhill Dam) on the Sheyenne River, Homme Reservoir on the Park River, and Bowman-Haley Reservoir on the Grand River is now provided by dams built by the Corps of Engineers.

The State, acting with municipalities and local entities, has constructed a number of storage dams for municipal use, recreation, and other purposes. Many other developments are in various stages of planning.

Irrigation

Irrigation facilities in North Dakota have been developed slowly in comparison to some other Western States. To date, irrigation development totals 80,000 acres, most privately developed. Of the State's total irrigated acreage, it is estimated approximately 66,000 acres are irrigated by surface waters and 14,000 acres from recently developed underground sources.

With Missouri River diversion accomplished by the Garrison Diversion Unit, it is anticipated that 20,000 acres per year for the next 50 years will be added to irrigation developments. This bright outlook for irrigation will enable other objectives of water conservation to be accomplished in the State.

Water Quality

Water quality varies greatly in North Dakota. The principal streamflows of the Missouri and Red Rivers in the State have good to excellent quality, while the quality of underground supplies varies widely. Devils Lake and Stump Lake generally are saline and brackish (depending on runoff conditions) and are unfit for use.

All streams have felt the impact of pollution from municipal and industrial wastes, irrigation return flows, and wildlife refuges. Especially in the east, drainage from farmlands and feedlots, as well as the increasing use of pesticides, adds to the pollution problem. But acute pollution problems in North Dakota have been largely local in nature and most of these are being corrected. All of the State's communities along the Missouri and many other areas of the State have completed or are in some stage of planning or constructing sewage treatment facilities. North Dakota residents have strongly supported and cooperated in these municipal pollution abatement projects.

As one of the ten Missouri River Basin States, North Dakota has benefited from comprehensive development of the basin's water resources. For more than a decade, planning for pollution control has been a part of that development.

Responsibility for the State program is vested in the North Dakota Department of Health, with the Division of Sanitary Engineering providing administrative and technical services. Programs are being developed to assure that water pollution control facilities will keep pace with future population and industrial growth in North Dakota.

Power Resources

Today North Dakota has a total of 960,000 kilowatts installed in electric utilities and industrial plants. Of this amount, 400,000 kilowatts is hydroelectric capacity at Garrison Dam. The balance is from fuel-burning or steam electric powerplants, which produced 1.7 billion kilowatt-hours in 1966 as compared with 1.9 billion kilowatt-hours produced by Garrison. Investor-owned utilities and large rural electric transmission cooperatives have pioneered in the use of low-cost lignite coal for thermal power generation. With extensive deposits of this low-cost fuel, North Dakota stands on the threshold of becoming a "powerhouse" for the entire region. These coal deposits, inexpensively mined and coupled with abundant water supplies, give the State ample power for the future.

Electric power in the State is supplied by three investor-owned utilities, five generation and transmission cooperatives, 21 rural electric distribution cooperatives, the Bureau of Reclamation, and 10 municipally-owned systems. Major transmission lines also are interconnected with power systems in other States. Although load growths are in the neighborhood of 7 percent each year, this increasing demand can be readily met. Large-scale transmission facilities—including powerlines, substations, and auxiliary equipment—have been installed to convey this energy to market load centers.

This ten-story-high Lauchammer Wheel is used to uncover the carbonaceous material lignite.

Mineral Resources

In little more than a decade, mineral production skyrocketed to a position of prominence as a major source of income in North Dakota. The annual value of the State's mineral output, worth approximately $100 million today, was less than $21 million as recently as 1963.

This remarkable growth can be attributed primarily to the development of North Dakota's petroleum resources which, along with natural gas and natural-gas liquids, account for over 80 percent of the total mineral value. But, North Dakota is also an important supplier of other minerals. From its deposits come large volumes of coal (mostly the low-rank variety known as lignite, which is also a source of uranium and molybdenum); millions of tons of sand and gravel; and lesser amounts of other minerals such as clay, stone, sulfur, salt, and gem stones.

Petroleum and Natural Gas

Although petroleum production in North Dakota only dates back to 1951, when the Williston Basin was opened, by 1958 there were over 1,100 producing wells, and today the number of wells in the State exceeds 2,000. Annual production totals more than 27 million barrels of crude oil valued at about $70 million, placing the State among the Nation's top dozen in oil output. Proved reserves are estimated at approximately 400 million barrels.

Most of the oil production is concentrated in the State's northwestern counties. Williams County, with such important producing areas as the Beaver Lodge, Tioga, Capa, and Grenora fields, has the largest output; McKenzie, Burke, and Bottineau Counties are also major producers. The remaining production is scattered through Billings, Divide, Dunn, Mountrail, Renville, Stark, and Ward Counties. At first, all the oil came from reservoirs in a single formation, the Madison Limestone, at depths from 5,000 to 8,000 feet; this formation is becoming depleted, but oil has been discovered in at least five more formations, two shallower and three deeper, and important production is assured for many decades.

Natural gas output in the State totals about 41 billion cubic feet annually, valued at over $6 million. Bowman County is the principal producer, and much of the gas is used to heat the homes of North Dakotans. In Burke, McKenzie, and Williams Counties, some natural gas also is obtained from wells that are primarily sources of oil. North Dakota also produces significant amounts of natural gas liquids, including natural gasoline, butane, and propane, which are extracted from "wet" natural gas.

Lignite

A soft, porous, carbonaceous material that ranks between peat and subbituminous coal, lignite is brownish-black in color and is sometimes called brown coal. North Dakota, which produces lignite coal exclusively, ranks first in coal resources in the United States; and only three nations of the world are estimated to have greater producing potential. The State's annual output is around 2.6 million short tons, valued at more than $5½ million, while resources are estimated at about 350 billion tons.

The principal centers of lignite production in North Dakota are Mercer County in the west-central part of the State, and Burke and Ward Counties in the northwest. The size of the operations varies greatly, but most are small, with annual output of less than 50,000 tons each.

Some coal beds are as much as 20 feet thick. Once laboriously mined with pick and shovel, the coal is now mined largely by machinery in great open pits. With modern technology and equipment, the open-pit mines can produce almost 46 tons per man-day compared to the national average of about 17½ tons per man-day in underground mining.

About two-thirds of the fuel mined in North Dakota is used for generating electric power; most of the remainder, for heating. Lignite also is used as a source of activated carbons, montan wax, liquid fuels, and a wide range of organic chemicals. One form of oxidized lignite, called leonardite, is employed in wood stains, fertilizers, and as a thickener in oil well drilling muds.

Use of lignite, however, is somewhat limited by the nature of the substance, which has a low heating value and a high moisture content. In addition, North Dakota's lignite beds are at some distance from the more heavily populated parts of the Nation that would provide the largest markets for the fuel. But, today, important research programs are aimed at overcoming these problems by finding more and better ways to use lignite.

Uranium

Uranium mining in North Dakota began in 1963. Uranium oxide is present in very small amounts in lignite deposits, and when the lignite has been mined and burned, the oxide may be extracted from the ash and shipped as far away as New Mexico for further processing.

Production centers mainly in Bowman County, where the lignite is of value principally for its uranium content. Precise figures on tonnages mined and extracted are not available, but the annual value of the product is estimated at about one million dollars. Reserves of uranium oxide are estimated at about 1,000 tons, with a value of from $5 to $8 a pound.

Nonmetals

The value of nonmetal mineral commodities produced in North Dakota is around $11 million, roughly 12 percent of the total mineral production value for the State. Recent years have seen considerable gains in nonmetal output because of an accelerated highway building program and the accompanying demands for sand, gravel, and stone.

In recent years, North Dakota highway-building contracts totaling around $25 million a year have been awarded. Rigid specifications for road construction require that much of the sand and gravel used be washed, screened, or otherwise prepared. This is done at about 350 locations, with portable plants ranging in output from less than 25,000 to about 300,000 tons per year.

Stone is used for riprap, in concrete, and as road stone, most of which is used in highway construction.

Clay is produced in the State for use in manufacturing lightweight aggregate, building brick, and other heavy clay products. It is also used for fine art pottery clays. Fire clay is used for making sewer tile. A small quantity of bentonite is supplied for manufacturing prepared mortar.

Among gem stones gathered in the State are agate, chalcedony, jasper, and petrified wood.

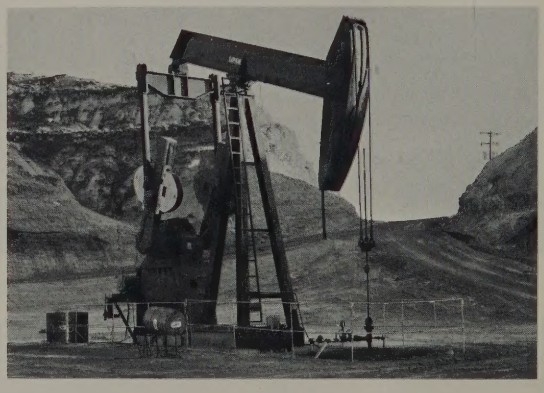
Petroleum production is a relatively new venture.

Vast deposits of salt, discovered during drilling for oil, lie buried beneath the North Dakota plains. Eleven thick beds of nearly pure salt are known, containing a total volume of more than 1,700 cubic *miles* of salt! The salt is recovered by injecting water into the salt bed and pumping out and processing the resulting brine. This salt is used principally for stock feed, as an additive in oil well drilling solutions, and in water softening. Shipments are also made to neighboring States, to the upper Midwest, and to Canada.

Elemental sulfur is recovered in natural gas processing plants at Lignite in Burke County and at Tioga in Williams County. Both production and value of the product have been increasing in recent years.

Crude vermiculite from out-of-State deposits is processed at a plant in Ward County to obtain a product used for insulation, as a lightweight aggregate, in premix plaster, for soil conditioning and for poultry grit.

Most oil is produced in the northwestern counties.



Fish and Wildlife

The Flickertail State, where less than a century ago the American bison roamed with the elk and the prairie bighorn, is still a frontier for the outdoorsman. But, realization of the full recreational potential of North Dakota may still be a decade away.

Before sod was broken, this region was one of the great grassland areas of the world, typically rich in numbers and species of wild creatures. This was a land of bounty for the Sioux, Hidatsa, Mandan, Arikara, Chippewa, Assiniboines, Cheyennes, and other nomadic and sedentary Indian tribes.

A century elapsed after Verendrye visited North Dakota before wildlife felt the brunt of the white man's incursion. Lewis and Clark commented on the abundance of the sharptailed grouse, which they called "pointed tail prairie chicken." Audubon saw his first praire bighorn on the Little Knife in 1843, a decade after Maximilian saw three bighorn sheep; the last bighorn in North Dakota was reported killed in 1905.

Pronghorns and bison covered the plains as they moved "after the grass," but the last half of the 19th

century spelled their doom as the most common of the plains foragers. The last big "buffalo" hunt took place on the headwaters of the Cannonball in June, 1882, when 600 well-mounted Indians killed 5,000 bison in two days. Disease decimated the pronghorn herd between the Yellowstone and the Missouri in 1873; the population of this fleet animal hit an all-time low—225—in 1925.

Elk and grizzlies, both common until about 1880, disappeared by the turn of the century. Both mule and whitetail deer almost became extinct but have been restored by progressive game management.

Restoration of Some Larger Game

In 1956, bighorn sheep were reintroduced into North Dakota with the release of 18 animals in the rugged Little Missouri drainage. The herd has responded well and at present numbers about 80. A limited bighorn hunting season should be possible within the next few years.

The comeback of the pronghorn and the mule and whitetail deer in North Dakota has been a happy chapter in the history of wildlife in North America. Through scientific game management supported by a sympathetic public, the pronghorn herd was built to more than 14,000 by 1966, when a disastrous three-day blizzard wiped out half the herd. Herds have been rebuilt. The 1966 blizzard also cut deeply into other wildlife populations in the western and southern areas of the State.

Both species of native deer also have responded well to game management programs. The mule deer herd numbers about 20,000 animals and whitetails, more widely scattered, number about 80,000. Deer and pronghorn support big game hunting by about 45,000 North Dakotans each year.

Game Birds

For the scattergun enthusiast, grouse and waterfowl have been the backbone of North Dakota's fall hunting. The great duck factory of the northern prairie States and the southern Provinces of Canada once put 200 million ducks a year on the wing; North Dakota still has more wild ducks than any other State, except Alaska. Today, the State attracts waterfowl hunters from many States because of its quality hunting. North Dakota is also on a major flyway of several species of geese, the sandhill crane, and the rare whooping crane.

Sharptailed grouse, one of the four grouse species in the State, are found in every county but are most numerous in the southwest corner. North Dakota boasts the largest sharptail population in the United States and considers this species to be underharvested.

Other species of grouse include the pinnated grouse or prairie chicken, the sage grouse, and the ruffed grouse. The pinnated grouse followed the plow to North Dakota but has undergone a severe population decline in the past several decades. Ruffed grouse, found in the Turtle Mountains and other hilly forested areas, also are few in numbers. Limited hunting is allowed of the sage grouse, found in the extreme southwestern part of the State.

Exotic game bird species introduced into North Dakota have had mixed success there. Ringneck pheasants, stocked first in 1909, peaked in the mid-1940's when 2½ million were harvested annually from 1944 through 1946 and have declined since as land use has become more intense. Hungarian partridge, which furnish increasingly popular sport for hunters, are found statewide but are most numerous in the north-central counties. Wild turkeys are found principally in the southwestern corner of the State and are hunted by permit only.

Winter Hunting and State Game Areas

Chief winter hunting activity is aimed at predators—foxes, coyotes and bobcats. These are hunted with calls from a variety of cold-weather vehicles.

There are more than 75 State game management areas and more than 62 Federal waterfowl refuges in North Dakota, all of them managed for wildlife production and protection. All the State's areas and some of the Federal areas are open to hunting. Continued land acquisition and more intensive management are necessary to meet the increasing pressures of more intensive land use.

Sport Fishing

While North Dakota does not have a reputation for its fishing, such recognition is long overdue. The improvement in both quality and quantity of sport fishing has boosted fishing license sales from 30,000 to the 100,000 mark in the past 15 years.

License-sale increases reflect two things: a tremendous increase in the fishing waters available as a result of reservoir construction and an increase in the numbers of the more desired fish species resulting from better fish management. The creation of Lake Sakakawea (formerly known as Garrison Reservoir) on the Missouri River alone tripled the total fishing water of this State.

Twenty or more years ago, most North Dakota lakes and streams furnished carp, bullheads, suckers, perch and crappies, but not much else for the fisherman. Today, some of the best northern pike, walleye, and sauger fishing is available in the big reservoirs, largemouth bass are caught in many of the State's thousands of stock dams, and fishing for trout at small reservoirs offers high quality angling as well as a high catch rate.

New State big fish records are being broken with regularity as anglers make greater use of the State's major reservoirs. Northern pike from Lake Sakakawea taken by sport fishermen have topped 34 pounds, and the world's record sauger came from the tailwaters of this dam.

Fishing for Livelihood

In addition to their recreational value, North Dakota fishery resources have commercial significance. During recent years, approximately 500,000 pounds of carp, buffalo fish, catfish, bullheads, paddlefish, suckers, and perch have been harvested annually. Fish are taken on the Missouri River, its mainstem reservoirs, and certain inland lakes.

North Dakota's commercial fishery stocks are significant and yet underharvested. Many more commercial fishermen could be employed.

Experimentation with new species by fisheries' managers holds great promise for sport fishermen.

Skiing is becoming more popular throughout the Nation; North Dakota is no exception.

Parks and Recreation

North Dakota offers both visitor and resident a variety of recreational opportunities at National, State, city, and county parks, historic sites, and privately-owned facilities.

Among the major attractions of the State are the Theodore Roosevelt National Memorial Park, the Badlands, the Turtle Mountains, Garrison Dam and Lake Sakakawea, and the International Peace Gardens. Popular recreational pursuits include sightseeing, picnicking, camping, hunting and fishing, water sports, and nature study.

National Park Service

Two units of the National Park System are located in North Dakota: Theodore Roosevelt National Memorial Park in the western part of the State and Fort Union Trading Post National Historic Site, in the northwestern corner. Part of the historic site lies in Montana.

Theodore Roosevelt National Memorial Park includes some 70,000 acres of the spectacular badlands along the Little Missouri River where, as a young man, Theodore Roosevelt hunted bison and other big game and engaged in cattle ranching.

"The badlands," wrote Roosevelt, "grade all the way from those that are almost rolling in character to those that are so fantastically broken in form and so bizarre in color as to seem hardly properly to belong to this earth."

The national memorial park, established by Congress in 1947, commemorates Roosevelt's enduring contributions as the Nation's first "Conservation President."

When Roosevelt went to the North Dakota Badlands in 1883, he found a region relatively unspoiled by man. He was fascinated by the wilderness where he could witness nature in her original design.

During the decade that followed, he saw the exploitation of the region by unrestricted hunting and uncontrolled grazing and shared with others the disaster brought to the open cattle range industry by the severe winter of 1886–87.

From first hand experience and observation, Roosevelt learned of the exhaustibility of our natural resources and the dangers of over-exploitation of the Nation's perishable assets.

The park's value lies not only in its association with the Roosevelt story, but in its scenic beauty and unusual geologic history.

The geology of the area is as fascinating to the present-day visitor as it was to Roosevelt. Erosion has carved the land into sharp buttes and mesas and has uncovered petrified trees and layers of many-colored clays, silts, and sandstones, interspersed with layers of lignite. Sometimes layers of lignite catch fire from lightning or other natural causes and burn slowly for years. These burning layers usually bake the nearby clay layers into a red, bricklike substance locally called "scoria" or clinker. Outcrops of red scoria occur at many places in the park.

Animal life in the park is diverse, though some of the native species have disappeared since Roosevelt's time. Today there are mule deer, antelope, bison, and a number of other species.

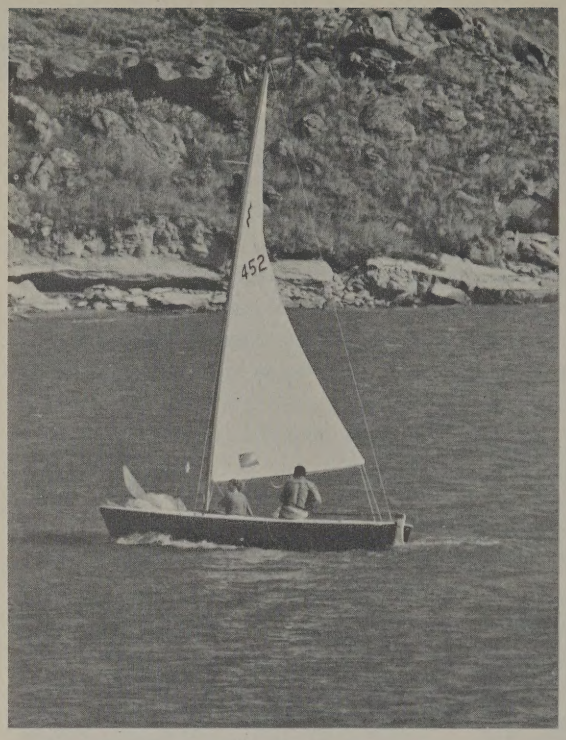
Along the park roads are several "towns" of black-tailed prairie dogs. These quick-moving rodents, though they do not hibernate, sometimes stay underground all winter living on fat stored up during the summer and fall.

There are various types of birds in the park: magpies, hawks, falcons, eagles, owls, woodpeckers, larks, and swallows, among others.

The park has three separate sections: The South Unit which adjoins Medora; the North Unit near Watford City; and the Elkhorn Ranch site located along the Little Missouri River about midway between the North and South Units. The Elkhorn Ranch was Roosevelt's home while he was in the North Dakota Badlands.

Campgrounds and picnic grounds are available in both the North and South Units. Meals, supplies, and overnight lodging, though not available in the park, may be obtained in nearby towns.

The park is open all year. To approach the North and South Units, east-west travelers can use U.S. 2 and Interstate 94. If traveling north-south, U.S. 85 leads to both units. This highway intersects U.S. 2 near Williston and Interstate 94 about 18 miles east of Medora. The Elkhorn Ranch site can be



The captain and crew of this "Lightning" find the mainsail sufficient as they cut through the water.

reached only by a rough dirt road, and visitors should make local inquiry before attempting this drive.

Fort Union Trading Post National Historic Site was authorized by Congress in 1966. The Fort site has been donated by the North Dakota Historical Society; it will be formally established when other lands within the boundaries of the authorized national historic site are in Federal ownership.

Built in 1828, Fort Union was the principal fur trading establishment on the Upper Missouri River and in the Northern Plains region for nearly four decades. During this period, the Fort was used by trappers and fur traders responding to demands from the Eastern United States and European markets for pelts. Owners of the Fort maintained trade with Indian tribes for hundreds of miles around and had direct influence on Indian relations. These traders and hunters were trail blazers for future settlers.

The Upper Missouri River, with tributaries reaching deep into the beaver-rich Northern Plains region, became territory coveted by many rival trading companies seeking a share of the western fur harvest.

The Fort, first named Fort Floyd, was built after the merging of the two largest fur companies of the region, the Columbia Fur Company and the Western Department of the American Fur Company.

Kenneth McKenzie, so-called "King of the Missouri," was in charge at Fort Union for the American Fur Company. It was the objective of the Upper Missouri Outfit, the name generally used in referring to McKenzie and Fort Union, to establish a trading post near the confluence of the Yellowstone and Missouri Rivers. Although two other posts were built by the company further up the Missouri, Fort Union became the main base of operations in the region.

As the demand for beaver pelts declined, so did the importance of Fort Union. It was sold to the Northwestern Fur Company in 1865.

In 1886, the Army established Fort Buford nearby, and the following year purchased Fort Union to provide building material for the new Army post. The great house, once occupied by the "King of the Missouri," and the 16-foot timber pickets surrounding the 220-foot-square quadrangle were torn down. All that remains of Fort Union today are the remnants of the two masonry bastions and earth-mound outlines of the Fort.

State Recreation Resources

There are some 149 State-owned outdoor recreation areas in North Dakota including eight parks, nine park reserves, 52 historical sites, 79 game management areas and one recreation forest.

A comprehensive program is underway to expand the State's recreational facilities to meet increasing demands. Indicative of the new demand has been the annual rise in attendance of some 10 percent at State parks, reaching a total of some 500,000 visitors in a recent year.

State Parks

The North Dakota Park Service, established July 1, 1965, manages the State parks and park reserves which encompass some 6,400 acres. Facilities for picnicking, water sports, and camping are provided at most of the State parks.

The largest, Sakakawea State Park, on Lake Sakakawea, is a relatively new recreation area of some 886 acres, with a marina and scenic drives, among other attractions. The 34-acre Fort Abercrombie State Park is the smallest facility.

Icelandic State Park, in the northeastern part of the State, is nestled in the Pembina Hills on the shore of a beautiful lake created by the Renwick Soil Conservation District Watershed Dam. Farther south, the Turtle River State Park lies in the Red River Valley through which the Turtle River winds. A privately-owned and operated winter ski resort is located within its 486 acres.

Close to the Canadian border is the 727-acre Lake Metigoshe State Park. Its outstanding attractions are the beach and picnic-camping developments on the shore of the lake. Fort Abraham Lincoln State Park, south of Mandan, has a museum and restored Mandan Indian earth lodges.

Beaver State Park, in Logan County, is a small scenic area on the shore of Beaver Lake, with boating, swimming, camping, and picnicking facilities. The 116-acre Totten Trail State Park lies on the shores of Snake Creek Reservoir, which is separated from Lake Sakakawea by an embankment.

The State also has a number of park reserves set aside for future development.

Additional information about North Dakota State Parks and State Park Reserves can be obtained from the Director of State Parks, State Capitol Building, Bismarck, N. Dak. 58501.

State-Owned Historical Sites

Historical areas, which include forts and trading posts, battlefields, and Indian villages, commemorate the early development of the Dakota territory and the State of North Dakota. Many of the sites are small; some contain only markers denoting their historic significance.

The 128-acre Chateau de Mores Historical Park in Billings County near Theodore Roosevelt National Memorial Park is one of the most well-developed historical sites in North Dakota. It contains the Chateau de Mores, built by the Marquis de Mores in 1883, a picnic and campground, and remains of the de Mores' packing plant. Fort Mandan in McLean County overlooks the Lewis and Clark winter camp of 1804–5. Fifteen of the original buildings of the Fort Totten Military Post still stand at Fort Totten in Benson County. Steamboat Warehouse in Burleigh County was the site of the Northern Pacific warehouse for freight moving north by steamboat on the Missouri River.

Among the landmarks that appeal particularly to Indian history buffs and archeologists are the Huff Indian Village in Morton County, the Molander Indian Village in Oliver County, the Menoken Indian Village and the Double Ditch Indian Village, both in Burleigh County, and the Crowley Flint Quarry in Mercer County.

Historic Highway

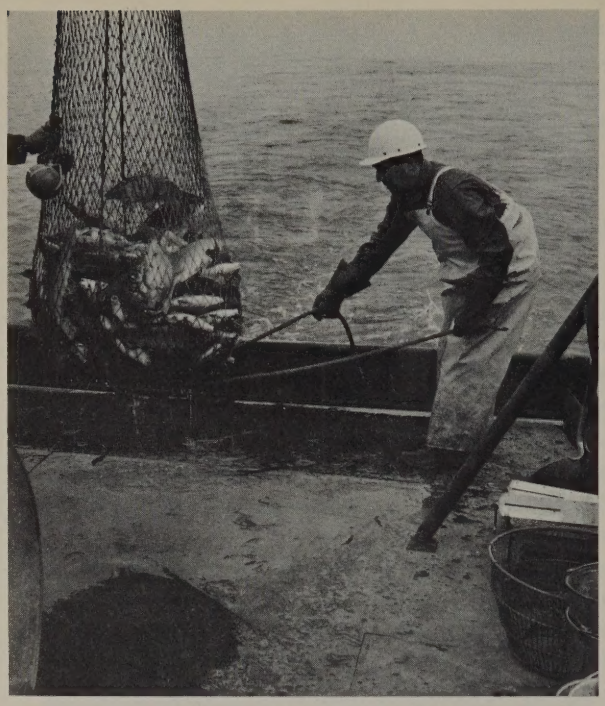
One of North Dakota's most scenic highways is the "Lost Bridge Road," a 51-mile stretch of ND 22 between New Town and Killdeer. The road passes through some of the most rugged and historic country found in the State. The Crow-Flies-High observation point, west of New Town, affords a magnificent view of Lake Sakakawea. From there, the road passes through the Fort Berthold Indian Reservation, across wide-open prairie lands to the valley of the Little Missouri. The buttes and gorges of the Badlands and the limestone cliffs of the Killdeer Mountains can be seen along this road. A panoramic view of hundreds of square miles of prairie is in store for those hardy enough to climb to the top of the Killdeers, two lofty hills extending more than 10 miles and rising 600 feet above the prairie.

Details about the State historic sites are available from Superintendent, North Dakota State Historical Society, State Capitol Building, Bismarck, N. Dak. 58501.

Privately-Owned Recreation Facilities

Unique among the North Dakota recreation areas is the International Peace Gardens in Rolette County on the Canadian Boarder. The Gardens are a nearly 900-acre memorial to peace between the United States and Canada, symbolizing that two nations can and do live amicably along the longest unfortified boundary in the world. They were established by trust and are supported by appropriations from the North Dakota and Manitoba legislatures, and by contributions from individuals, and private organizations. Recreation facilities include formal gardens and pools, a lodge, camping and picnicking grounds, scenic lake drives, and nature trails.

The more than 200 privately-owned outdoor recreation facilities in North Dakota range in size from small historic landmarks to well-developed resorts. Many of the State's camp and trailer sites, hunting lodges, ski centers, golf courses, fishing camps, and marinas are privately-owned. Tourist information can be obtained from: Director, State Travel Department, Bismarck, N. Dak. 58501.



Programs of Federal Natural Resource Agencies

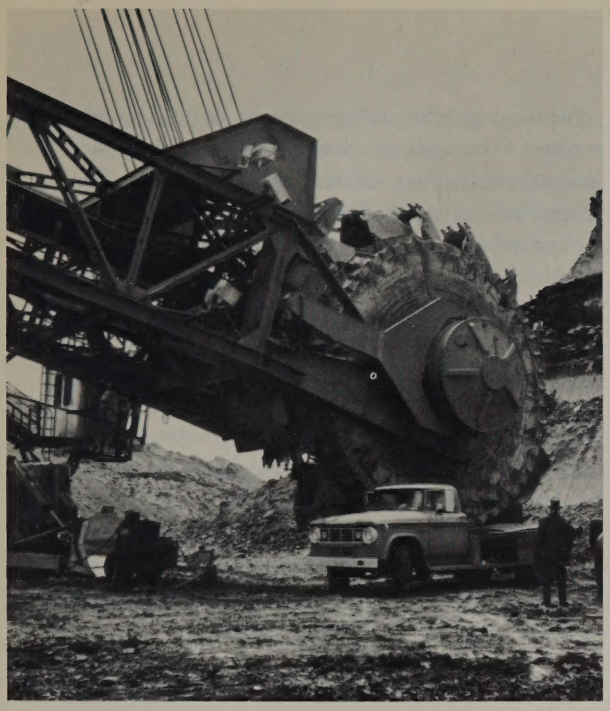
The natural resource functions of the Federal agencies represented in this booklet are extensive and detailed and are only briefly described. Additional information can be obtained by contacting the offices noted in the following programs section.

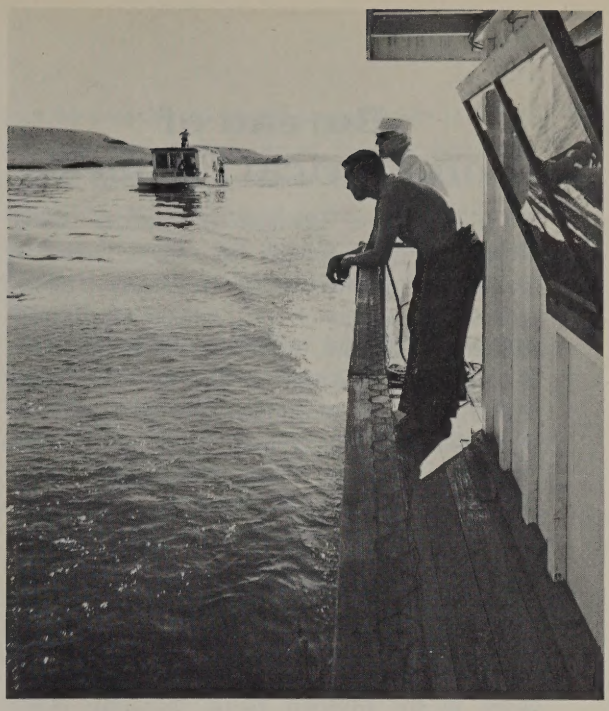
U.S. Army Corps of Engineers

In addition to its military responsibilities, the U.S. Army Corps of Engineers is concerned with the development of water resources. Corps' studies and construction projects are authorized and funded by Congress. Among its projects in North Dakota are the Garrison Dam, Baldhill Dam, Homme Dam, and several local flood control projects.

Garrison Dam, located on the Missouri River 75 miles above Bismarck, is part of a comprehensive plan for flood control and water resources development on the Missouri River Basin. In the past, floods caused considerable damage to North Dakota. Now Garrison Dam, begun in 1946, prevents a great deal of this damage.

But flood control isn't the only contribution which the dam and adjacent reservoir (Lake Sakakawea) make to the North Dakota economy. They also improve navigation, provide hydroelectric power and





storage of water for irrigation. An incidental benefit of the Garrison Dam and Lake Sakakawea is the growth of recreational opportunities. The reservoir provides fishing, swimming, water skiing, boating, and camping.

Another multiple-purpose project, Oahe Dam and Reservoir is usually considered a Missouri River development of South Dakota. However, about one-third of the reservoir lies in North Dakota. Its principal importance to North Dakota is as a recreational and power facility.

In addition to multiple-purpose projects, the Corps maintains flood control projects such as Baldhill Dam, Homme Dam and Reservoir, the Lake Traverse-Bois de Sioux project, several units in the Red River of the North project, and local projects for Marmath and Mandan. Not only is protection from floods which sometimes occur as a result of snowmelt and warm spring rains provided, but, on the other hand, some of these projects also alleviate water shortages.

Construction is nearly completed on the Bowman-Haley Dam and Reservoir; plans are being made for the Pipestem Dam and Reservoir, about 5 miles upstream from Jamestown.

The Corps works in cooperation with other agencies in efforts to conserve water for municipal and industrial use, irrigation, and wildlife conservation. The Corps of Engineers also is responsible for establishing rules for the use of storage capacity allocated to flood control at reservoirs funded wholly or in part by the Federal government.

As part of the effort to control floods, the Corps of Engineers removes snags and debris from stream channels. The Corps also offers emergency aid during floods or other disasters. This aid may include rescuing marooned people, removing property or livestock which is endangered, and repairing or strengthening levees.

Studies of flood and related water resource problems are conducted by the Corps. These studies are authorized by Congress or by the Senate or House Public Works Committees and are generally the result of the concern of people living in the affected area. A number of these surveys are underway in North Dakota.

Additional information on projects of the Corps of Engineers can be obtained by writing the U.S. Army Engineer District, 6012 U.S. Post Office and Courthouse Building, 215 North 17th Street, Omaha, Nebr. 68102.

Bureau of Commerical Fisheries

The Bureau of Commercial Fisheries of the Department of the Interior has a major interest in research and development of the extensive, underutilized populations of carp, buffalo fish, catfish, bullheads, paddlefish, suckers, goldeye, and perch in the reservoirs and lakes of North Dakota. Because of this interest, the Bureau has been concerned with water resources planning in the State.

In cooperation with the State, the Bureau collects, analyzes, and disseminates statistics on North Dakota's annual harvest and value of commercial fish.

A program aimed at improving the image of fishery products and emphasizing the value of fish in the diet is being conducted throughout the Midwest. The unrealized commercial potential of fish produced in the Missouri Basin, including North Dakota, is being publicized through the mass media and other means.

Under the Commercial Fisheries Research and Development Act, which is administered by the Bureau, North Dakota is currently studying commercial fish stocks in Lake Sakakawea and investigating market outlets for fish.

Further information on activities of the Bureau of Commercial Fisheries in North Dakota may be obtained from the Bureau of Commercial Fisheries, 5 Research Drive, Ann Arbor, Mich. 48104.

Bureau of Sport Fisheries and Wildlife

The Department of the Interior's Bureau of Sport Fisheries and Wildlife has focused its attention on North Dakota because of its position as a leading waterfowl-producing State and its potential for expanded hunting and fishing opportunities.

It was in North Dakota that much of the Bureau's early work in preserving migratory waterfowl began in the 1930's with establishment of several of the Nation's first waterfowl refuges. Today the Bureau manages 63 national wildlife refuges and operates a major part of its national program in wetlands preservation in North Dakota.

National wildlife refuges in the State not only produce thousands of ducks each year but offer sanctuary to millions of other migratory birds. The refuges are managed, also, to create suitable habitat for upland game birds, furbearers, big game, and song birds. The refuges include one big game enclosure, Sullys Hill National Game Preserve, where native American bison, elk, and deer can be seen under natural conditions.

Recreational opportunities on these refuges include picknicking, swimming, hunting, fishing, bird watching, camping and boating, which combined attract about 200,000 visitors a year.

In addition to the 63 major refuges, the Bureau manages waterfowl production areas totaling more than 400,000 acres. These are managed to produce waterfowl and preserve breeding habitat.

The wetlands preservation program in North Dakota is operated from offices at Minot, Devils Lake, and Jamestown.

Bureau biologists work with soil conservationists, State highway department engineers, and county commissioners to plan protection and improvement of wildlife habitat as part of other governmental programs.

Bureau Research

One of the Bureau's five wildlife research centers was established recently at Jamestown. This is the Northern Prairie Wildlife Research Center, operating in conjunction with a field station near Woodworth. In broad terms, the research program there is directed toward finding new facts about the breeding biology and habitat requirements of prinicipal migratory waterfowl species and other migratory birds.

At a headquarters-laboratory complex near Jamestown, research is conducted into factors influencing annual production of waterfowl in their breeding range, water quality, productivity of waterfowl foods in wetlands, losses from disease, breeding physiology and development, and testing of new management techniques.

Primary objective of the Woodworth field station is to carry on research in wildlife-land-use relationships. Here, the effects of agricultural practices on habitat conditions and duck production are studied, new methods of controlling crop damage by water-

fowl are sought, and new habitat management techniques are developed and evaluated.

The effect of Federal water-use projects on fish and wildlife is studied by the Bureau's Division of River Basin Studies, which has its headquarters in Bismarck. Water development programs involved include projects of the Corps of Engineers, Bureau of Reclamation, Department of Agriculture, and other agencies where Federal licenses or permits are required.

To insure that fish and wildlife will be protected, when these projects are planned, development agencies are provided with biological data and relevant information about fish and wildlife. Where project features are harmful to fish and wildlife resources, biologists recommend other project features which offset or reduce the adverse effects. In many instances, hunting and fishing actually are improved this way.

Fish and wildlife developments which often result from this activity include wildlife refuges, fish hatcheries, public hunting areas, fishing bridges or platforms, habitat plantings, and a wide variety of other measures.

One of the major programs which currently involves River Basin Studies is the Garrison Diversion Unit, a vast project to irrigate more than a million acres of land in central, northern, and southeastern North Dakota. With its thousands of miles of canals, laterals, and ditches, this project will have far-reaching effects on fish and wildlife. As part of this project, plans have been developed for 36 major areas and numerous smaller areas totaling 146,000 acres which will be developed and managed to insure proper habitat and maximum production of fish and wildlife.

Fish Hatcheries and Game Management

Two major national fish hatcheries are operated by the Bureau in North Dakota. These are the Garrison Dam National Fish Hatchery below Garrison Reservoir at Riverdale and the Valley City National Fish Hatchery at Valley City. Trout, walleye, northern pike, and bass from these hatcheries are stocked in lakes and reservoirs.

New impoundments and intensive management by fisheries biologists have created a unique trout and warm-water fishery that did not exist in years past. Most of the millions of northern pike and walleye eggs hatched annually at these hatcheries are stocked immediately in waters free of predator fish. Fingerling fish are reared in hatchery ponds for stocking in waters that already contain other fish or where past studies have indicated low survival from fry stockings.

About one million rainbow trout fingerlings are stocked each year from Garrison Dam National Fish Hatchery. Stocking trout in new waters assures catchable-size trout one year after such plantings.

Federal game management agents of the Bureau are located in Bismarck, Devils Lake, and Minot and carry out a variety of law enforcement and wildlife management activities. Much of their work is aimed at coping with ever-shifting concentrations of hunters and waterfowl throughout the State and with periodic occurrences of crop depredations by migratory waterfowl.

Agents focus special attention on areas frequented by migrating whooping cranes, check U.S. hunters returning from Canada with game, work in cooperation with military installations regarding hunting by military personnel, carry out management programs on waterfowl breeding and migration areas, and inform and educate adult and youth groups interested in fish and wildlife.

Control and Other Programs

A varied program of nuisance animal and bird control, pesticides surveillance, and wildlife enhancement is carried out by the Bureau's Division of Wildlife Services. Supervisory offices are located in Bismarck with 10 district field assistants stationed throughout the State.

Predator control, aimed chiefly at coyotes, bobcats, foxes, raccoons, and skunks, is carried out in cooperation with interested State agencies, county boards, and associations. Selective control of predators, conducted on an individual request basis, is designed to maintain populations of these species without undue damage, loss, or hazard to individual and public interests.

The control program also includes reduction of problem rodent species and of nuisance bird populations causing appreciable damage. An educational program is conducted to help handle the rodent

problem and to instruct the public on suppression of animal-borne diseases such as rabies.

Regional specialists work closely with the North Dakota Game and Fish Department and the Agricultural Extension Service in promoting the safe use of pesticides with regard to fish and wildlife. Another specialist works on improving wildlife habitat on lands under Federal control and on private lands as agreed upon by the State.

Further information on the activities of the Bureau of Sport Fisheries and Wildlife in North Dakota may be obtained from the Bureau's Regional Office, 1006 West Lake Street, Minneapolis, Minn. 55408.

Federal Water Pollution Control Administration

The water pollution control program at the national level is administered by the Federal Water Pollution Control Administration of the Department of the Interior. The Administration cooperates with other water resource agencies and organizations—Federal, State, municipal, and industrial. It provides long-range planning, research and training, enforcement, and technical and financial assistance. The program aims to conserve waters for public supply, agriculture, industry, recreation, and propagation of fish and wildlife.

Since 1957, Federal grants, which currently constitute over 40 percent of the State's annual expenditure for water pollution control, have assisted North Dakota in expanding its program. These grants have enabled the State to carry out stream pollution studies, maintain inspection of waste treatment facilities, and plan for future installations.

The Federal program includes grants to assist local construction of waste treatment plants. North Dakota towns and cities have received over $4.5 million in Federal aid to help build more than 160 waste treatment facilities. At the same time, these communities have invested more than $15 million of their own funds in these facilities which serve approximately 300,000 people, resulting in improved water quality in more than 2,200 miles of streams.

A water pollution surveillance system provides data on the quality of water in the Nation's waterways. Three of the system's 139 sampling stations are located in North Dakota: One on the Missouri River at Williston; one on the Missouri River at Bismarck; and one on the Red River of the North at Grand Forks.

Research, Planning, and Training

Long-range comprehensive planning for water quality management is a prime requisite of the Federal program. Such programs are planned regionally or on a river-basin basis, and are aimed at permitting the use and re-use of water resources many times. These programs consider all present and anticipated water uses and allow for industrial and population expansion. The programs team up with and coordinate the actions of all water resource agencies, Federal, interstate, State and municipal. In North Dakota, the State responsibility is vested in the Division of Sanitary Engineering of the State Department of Health, in Bismarck.

For more than a decade, the Missouri Basin Inter-Agency Committee has been working on a comprehensive framework for water and related land resources development in the Missouri Basin. The FWPCA has helped plan for this resource development. Specifically, the FWPCA is identifying all sources of pollution, cataloging existing and needed waste treatment at these sources, and establishing present and long-range water-use and wastewater-discharge requirements. Data is broken down by subbasins so as to be usable by the individual States. Action is being taken where the need for water pollution control is obvious without awaiting completion of the studies. This comprehensive programming has its headquarters at the Missouri Basin regional office of the FWPCA in Kansas City. A supporting field office is located in Grand Forks to facilitate the studies of the Red, Souris, and Rainy River Basins, which are part of the Missouri Basin Region of the FWPCA.

Research and training are available to North Dakota's water agencies, cities, and industries at the Sanitary Engineering Center at Cincinnati, Ohio, and also at the FWPCA laboratories in Oklahoma, Oregon, and Georgia. Other research and training facilities being constructed will expand these services; additional research and training are supported by grants to colleges, universities, and other agen-

cies. Moreover, the FWPCA can provide, upon request, advice and assistance from expert scientific and engineering staffs for solving specific water pollution problems.

Standards and Enforcement

The Water Quality Act of 1965 provides for a forceful program to protect and enhance the quality of the Nation's waters. Each State is responsible for setting water quality criteria for its interstate waters and planning implementation and enforcement of the criteria adopted. The State plan must be reviewed and approved by the Secretary of the Interior. Water quality standards for interstate streams of North Dakota were approved by the Secretary in 1967.

The Federal Water Pollution Control Act provides enforcement procedures under which the Government is required to take action, where necessary, to abate pollution. The law fully recognizes the basic principle of Federal-State-local cooperation. One North Dakota stream, the Red River of the North, was the subject of an enforcement conference in 1965 which brought about corrective actions.

A treaty was signed in 1909 between the United States and Great Britain concerning boundary waters and other questions arising between the United States and Canada. It was agreed that "the boundary waters shall not be polluted on either side to the injury of health or property on the other." To carry out this agreement in the Red River of the North, the International Joint Commission formed an Advisory Board on Water Pollution to advise the Commission. The FWPCA and the State of North Dakota are represented on this Board.

Further information on the Federal Water Pollution Control Administration can be obtained by writing to the Missouri Basin Region, 601 East 12th Street, Kansas City, Mo. 64106.

U.S. Forest Service

The Forest Service of the U.S. Department of Agriculture administers three National Grasslands in North Dakota—the Little Missouri, Cedar River, and Sheyenne—containing 1,104,000 acres of Federal land. The Forest Service also cooperates with the North Dakota State Forester in programs for the protection and improvement of State and private woodlands. Forest and range research in North Dakota is conducted by the Forest Service under direction of its Rocky Mountain Forest and Range Experiment Station, with headquarters at Fort Collins, Colo.; within North Dakota the Experiment Station conducts field research through its Shelterbelt Laboratory at Bottineau.

Grasslands for Multiple Use

The Forest Service manages the National Forests and National Grasslands for many uses and benefits. These lands yield sustained harvests of renewable natural resources including wood, water, forage, and wildlife. They provide opportunities for outdoor recreation and, in some areas, yield natural gas, oil, and minerals.

The National Grasslands are unique in the National Forest System. They were authorized in the 1930's as emergency programs designed to end the land abuse, catastrophic erosion, and uneconomic agricultural practices that then were prevalent in much of the Great Plains. After 30 years of rehabilitation, the land has been stabilized, and these portions of the high plains serve as models of grassland agriculture. Through wise use of the land and its resources, agricultural operations on nearby farms and ranches are supplemented.

The National Grasslands in North Dakota provide grazing under paid permits for 68,000 cattle and 4,000 sheep. Hunting and fishing are permitted under State law, with an estimated harvest of more than 3,000 deer annually. Turkey, antelope, grouse, and waterfowl are among the other game species found. In these areas, water developments improve the grazing conditions of livestock, aid in wildlife preservation, and prevent erosion. Scattered stands of timber yield limited harvests of wood for fenceposts and other products, primarily for local use. A variety of outdoor activities are available, with hunting the main attraction.

The Forest Service works to improve the National Grasslands in many ways. Trees are planted as windbarriers. Range improvements such as fences, cattleguards, weed control, stock watering tanks and the like are constructed, often in cooperation with the local grazing association. Cooperative efforts for

wildlife improvement are undertaken with the North Dakota State Fish and Game Department. These may include protection of nesting areas, construction of ponds for fishing, and wildlife food and cover plantings.

The Forest Service cooperates with the North Dakota State Forester to protect 228,000 acres of State and private lands from forest and range fires. Through Federal-State programs, the State Forester distributes nearly a million tree seedlings each year for forest and windbarrier plantings and helps landowners improve the management of forest lands.

Shelterbelt Research

Through its Rocky Mountain Forest and Range Experiment Station, the Forest Service operates a laboratory at the University of North Dakota School of Forestry at Bottineau. There research is conducted to improve the establishment and maintenance of windbarriers, or shelterbelts, in the northern Great Plains. This includes the breeding of superior strains of trees, studies of adaptability of tree species to soils and climate, and studies of spacing and cultivation of shelterbelt plantings. The University, the Soil Conservation Service, and the Agricultural Research Service are actively cooperating with the Forest Service in this effort that will have a long-range effect on the protection of agricultural lands in the northern Great Plains.

Further information on activities of the Forest Service in North Dakota may be obtained by writing to the Forest Supervisor, Custer National Forest, Billings, Mont. 59101; Regional Forester, Northern Region, Federal Building, Missoula, Mont. 59801; Shelterbelt Laboratory, First Street and Brander, Bottineau, N. Dak. 58318; or Station Director, Rocky Mountain Forest and Range Experiment Station, Colorado State University, Fort Collins, Colo. 80521.

Geological Survey

Water resources investigations, topographic mapping, geologic mapping and mineral land classification of minerals that are subject to lease by the Federal government, supervision of exploration, development, and production of minerals on Federal and Indian lands—these are some of the more important duties of the Department of the Interior's Geological Survey in North Dakota.

Water Investigations

Water resources investigations by the Geological Survey in North Dakota determine and describe the location, quality, and quantity of water resources. Gaging stations on the major streams and on natural and manmade lakes provide information to solve problems relating to this resource. These stations are operated in cooperation with State and municipal agencies as well as other Federal agencies. Groundwater studies are made to locate aquifiers and to provide information for the intelligent development of the ground-water resources of the State. These studies are made in cooperation with State and county agencies.

Electric models that simulate ground-water and streamflow conditions are proving to be useful tools in the management of water resources. These models simulate what will happen to ground-water levels and river stages over long periods of time when water is pumped from ground-water reservoirs and streams. For example, a model of the water conditions in the area of Minot was used to help solve the problem of ground-water reservoir depletion.

Topographic Mapping

Topographic maps prepared and published by the Geological Survey show graphically the shape of North Dakota's land surface, water features such as lakes and rivers, and manmade features such as roads, boundaries, and cities. Topographic mapping in North Dakota is financed by Federal funds or by a cooperative program in which mapping costs are shared by the State and the Geological Survey on a 50–50 basis to complete mapping that is of mutual interest.

Topographic maps in the 1:250,000 series (1 inch represents about 4 miles) are available for the whole State. A topographic State map at 1:500,000 scale was prepared in 1961. Maps in either the 1:24,000 series (1 inch represents 2,000 feet) or the 1:62,500 series (1 inch represents about 1 mile) have been

published for 46 percent of the State (over 32,000 square miles). Additional areas of about 9,000 square miles are in the current mapping program. A long-range plan provides for complete modern topographic mapping of North Dakota by 1976.

Most of the present topographic mapping covers the north-central and eastern portions of the State. Much mapping remains to be done in the southwestern third of the State, which is drained primarily by the Missouri River. When these maps have been completed, they will provide basic data which is essential for the complete inventory and investigation of the State's mineral and water resources and for environmental and land-use studies.

Mineral Leasing

The Geological Survey is engaged in a geologic mapping and mineral land classification program for minerals that are subject to lease by the Federal government, primarily coal in the Williston Basin area.

The Geological Survey supervises exploration, development, and production of all leasable minerals including oil and gas on Federal and Indian lands. More than a million acres of public, acquired, and Indian lands are under Federal lease in North Dakota. The value of annual production from these leases is $8½ million, and the annual royalty return to the Federal treasury and the Indians is approximately $1 million.

Additional information may be obtained from U.S. Geological Survey, Department of the Interior, Washington, D.C. 20240.

Bureau of Indian Affairs

Today there are about 12,000 Indians in North Dakota, most of them living on or adjacent to reservations.

The reservations are: Turtle Mountain (Chippewa), in northernmost North Dakota; Fort Totten (Sioux), in central North Dakota; Fort Berthold (Hidatsas, Arikara, and Mandan Sioux), in western North Dakota; Standing Rock (Sioux), which straddles the boundary with South Dakota; and a portion of the Sisseton Reservation (Sioux) in the southeastern portion of the State.

Indian life in the Dakotas is generally far below the usually accepted economic and social minimums. The cultural transition has not been easy. Many Indians of the Dakotas have not fully learned the economic ways of modern life nor have they relinquished their old yearnings to live the life of their forebears.

The reservations are fragmented by various kinds of legal ownership. There are many tracts of land within reservation areas that are owned by non-Indians. This mixture of ownership in reservation areas creates a patchwork of units too small to manage efficiently. Some tribes have initiated a program of land consolidation to provide sufficiently continous tracts for lease or sale; the Bureau of Indian Affairs manages the lands, as trustee.

The Bureau of Indian Affairs of the Department of the Interior operates an office in Billings, Mont., devoted to investigating the impact upon Indian lands of the Missouri River Basin development, including the resulting loss of valuable bottom land by the tribes. Thus far, recreational enterprises, industrial and business expansion, and major irrigation improvements have not been realized to any great extent on reservations in the North and South Dakota sections of the Missouri River Basin. However, better homes and improved community facilities and services are being built.

Development of both natural and human resources is the goal of the Bureau of Indian Affairs and tribal governments.

Economic Development

Together the Bureau of Indian Affairs and tribal governments are exploring every means of improving tribal economies through resource development.

Oil has been produced on the Fort Berthold Reservation; exploration has provided small amounts of lease income to other reservations in the Dakotas. Lignite coal deposits offer more promise. North Dakota has huge lignite coal reserves, with extensive deposits in the Forth Berthold Reservation. Two lignite-fired steam generation plants are now operating near the reservation, and at some future date, lignite may become the basic raw material for a number of chemical industries in the area. Other reservation resources include iron-manganese, clays, shales, and limited forest holdings.

In 1953, the Wm. Wanger Jewel Bearing Plant was established at Rolla, N. Dak., near the Turtle Mountain Reservation under the management of the Bulova Watch Company. Members of the Turtle Mountain Band of Chippewa have proved so adept in the manufacture of miniature precision jewel bearings that they now comprise about 66 percent of the 150 employees.

Other industrial and business facilities recently established include a cheese plant at Standing Rock Reservation and Broken Arrow Resort at Turtle Mountain Reservation.

Education

Numerous Federal day schools, as well as several boarding schools, are still in operation in the Dakotas, although the trend is toward public schooling for Indian residents wherever possible. A number of non-Indian children also attend the Federal schools; and the Bureau has entered into cooperative agreements with some public school districts for sharing the costs of schools jointly operated by the school districts and the Federal government.

Adult education programs in rural communities are on the increase, and many of the reservations are involved in the "war on poverty"—not only in adult basic education, but in Head Start programs for preschoolers, the Neighborhood Youth Corps earn-and-learn program for high school students, and work experience programs for unemployed, unskilled adults.

The number of young Indians who go on to higher education continues to rise.

Housing

Nearly 700 low-rent public housing units for Indians are occupied or nearly completed in North and South Dakota.

Three other housing programs are available to Indians of the Dakotas: the Housing Improvement Program; the Mutual-Help Housing Program, whereby Indian people can substitute their labor for equity in a house; and a pilot project for adequate shelter housing, sponsored under the Office of Economic Opportunity. The Division of Indian Health of the U.S. Public Health Service is continuing its efforts to establish water supplies and sanitation facilities for individual Indian households.

Tribal governments are playing an ever-increasing role in the development and management of reservation resources. Elected officials continually review their tribal constitutions and recommend necessary changes to accommodate tribal programs.

Moneys made available through the Indian claims judgment awards, and as compensation for land taken for the construction of the Missouri River Reservoirs, have afforded several tribes opportunities to initiate various social and economic development programs. These programs include community development, agricultural development, business and industrial development, educational grants and loans, credit programs, and aid to families. In some instances tribal enterprises were established. The tribes are also making use of other Federal programs such as those provided through the Office of Economic Opportunity, Farmers Home Administration, and Economic Development Administration.

Social Services and Law Enforcement

A staff of social workers serves each of the tribes, providing information about financial assistance available to Indian people on reservations who are in need but not eligible for help from other sources. Child welfare services are provided, including foster care for children needing care outside their homes. There is close cooperation between the Bureau of Indian Affairs and the county welfare offices in all phases of the welfare program.

Police protection and law enforcement services are provided by the tribes and by BIA. Many reservations have their own court system, adjudicating both civil and criminal matters, except for the more serious or major criminal cases which are processed by the Federal courts. Tribal councils enact ordinances regulating the conduct of their members. In recent years the tribes have been active in improving their tribal court systems. Some tribes have sent judges to short courses, while other tribes have hired attorneys to serve as judges. Indian police receive in-service training, as well as training at local universities and the Chicago Police Academy.

The U.S. Public Health Service, Division of In-

dian Health provides comprehensive health care programs at all reservations in North and South Dakota. Hospitals are operated at Turtle Mountain and Standing Rock. Contract medical and dental care is provided at Fort Berthold Reservation. A health center and contract services are available at Fort Totten. In addition, a PHS Field Health Team provides assistance to Indians through health education, public health nursing, and preventive dental care.

Additional information on Indians and reservations in North Dakota and the activities of the Bureau of Indian Affairs may be obtained from the Area Director, Aberdeen Area Office, Bureau of Indian Affairs, 820 South Main Street, Aberdeen, S. Dak. 57401.

Bureau of Land Management

The Department of the Interior's Bureau of Land Management is responsible for managing 77,176 acres of public domain lands in North Dakota. Scattered throughout the State, these lands are managed for forage for domestic livestock and wildlife and for production of minerals and timber. The lands vary from smoothly rolling plains of glacial till to rough, broken badlands of raw shales and sparse grass. Because of the relatively small acreage of public lands in North Dakota, the Bureau has only one office in the State, the Little Beaver Project Office at Bowman. BLM's Montana State Director, with headquarters in Billings, Mont., has overall supervision of Bureau operations in North Dakota.

Conserving soil and moisture on the public lands is BLM's biggest job in North Dakota. Some 25,000 acres are considered "frail" lands, where intensive watershed management is necessary to halt heavy erosion.

BLM lands provide forage for 9,000 cattle and horses and 7,000 sheep. The lands are leased by 105 operators. In 1965, 57,302 acres were leased.

The public lands also provide homes and food for a large variety of wildlife that ranges from small rodents to big game such as deer and antelope.

The glacier-scarred central region of the State contains thousands of prairie potholes, small bodies of water that serve as nesting grounds for important populations of migratory waterfowl. In this area, 5,254 acres have been classified as significant for wildlife purposes.

Some of the highest producing oil and gas fields in the State are on lands leased by BLM. Coal and potassium rights are also leased. In addition, certain other materials such as sand and gravel are available on public lands.

Additional information on BLM activities in North Dakota can be obtained from the State Director, Bureau of Land Management, Federal Building, 316 North 26th Street, Billings, Mont. 59101.

Bureau of Mines

Although programs of the Department of the Interior's Bureau of Mines in North Dakota cover all minerals of economic importance, special emphasis is placed on the State's abundant resources of lignite, petroleum, and natural gas. The Bureau's activities are concentrated in three principal areas: technologic research, resource economics, and mineral-industry health and safety. Bureau experts cooperate with State and local representatives and with industry to help assure wise development and use of North Dakota's mineral riches and to promote safer and more healthful working conditions for those who extract and process them.

Coal Research

To further development of North Dakota's vast reserves of the low-rank coal known as lignite, the Bureau has established a lignite research laboratory at Grand Forks. The important work of this unit has been expanded to include research on all types of coal found in the West.

The Grand Forks Coal Research Laboratory, adjacent to the campus of the University of North Dakota, is exceptionally well equipped for both small- and large-scale research programs. Typical recent projects indicate the wide range of research conducted. These projects have included research and development that yields methods for preventing the spontaneous combustion of lignite in storage piles; improved processing techniques that prevent lignite from freezing into solid, unmanageable

masses during winter shipment; technically feasible processes for making gas with a good heating value from coal; and studies to facilitate the use of lignite as fuel for electric powerplants.

Petroleum Research

With more than 80 percent of the total annual value of mineral production in North Dakota attributed to petroleum and natural gas, these important fuels receive considerable attention from Bureau scientists and engineers. Much of the Bureau's research on oil and gas has centered on techniques for obtaining maximum recovery of both fuels from the rock formations in which they occur. Bureau reservoir engineering specialists, with headquarters at Laramie, Wyo., have investigated the characteristics not only of different types of crude oil and gas, but of the reservoir rocks from which they come. The knowledge obtained helps industry to devise more efficient extractive techniques and equipment.

A Bureau study of special interest is obtaining basic knowledge of the characteristics of carbonate rock reservoirs in the famed Williston Basin. Another investigation provided information on the availability of nitrogen gas from oilfields in North Dakota. Bureau engineers reported that the large volume of inert nitrogen available under high pressure should have useful applications in oil-production operations.

A more general study of oilfields in the Williston Basin provided engineering data on all phases of production, together with maps and crude petroleum analyses for 137 separate oil pools, many of which are in North Dakota.

Health and Safety Activities

As it does in other States, the Bureau provides training for mineral-industry workers of North Dakota in first-aid methods, mine-rescue techniques, and accident prevention. Bureau engineers investigate mine fires, explosions, accidents, and general safety conditions at mines—all with cooperation from State officials. Most large mines in North Dakota are of the open cut or strip type so safety work there is quite different from that needed in regions where underground mines predominate.

The Bureau also conducts a program for controlling fires that occur accidentally in coal outcrops and can threaten vegetation and property over large areas, as well as destroy valuable fuel resources.

The gathering and publication of statistical and economic information on North Dakota's mineral industry is an important Bureau function in the State and one in which there is a great deal of cooperation between State and Federal agencies. Statistics are regularly compiled on the quantity and value of minerals and fuels produced in North Dakota, on the volume and value of mineral production by counties, and on employment and injuries in the mineral industries. These statistics, combined with information on the distribution and use of the State's mineral output, are published regularly by the Bureau with the cooperation of the State Geological Survey. The data provides a valuable guide for industry and others concerned with resource conservation and development.

To evaluate the economic potential of North Dakota's mineral deposits, the Bureau performs detailed engineering appraisals of mining properties throughout the State. In addition, Bureau experts compile information on current and projected water needs of mineral industries and conduct investigations of mineral deposits in areas such as Indian reservations and proposed reservoir sites. Other studies are designed to determine how effectively coal can be recovered by different mining methods and the probable effect of modern mechanized mining. Coal-mining firms in North Dakota have been leaders in the use of new equipment, such as large draglines and wheel-type excavators.

Further information concerning Bureau of Mines activities in North Dakota can be obtained from the Office of the Area Director, Bureau of Mines Area V, Building 20, Denver Federal Center, Denver, Colo. 80225.

National Park Service

Under a continuing long-range development and improvement program for all units of the National Park System, projects are underway or planned for the areas administered by the Department of the Interior's National Park Service in North Dakota.

Construction of a 7-mile section of the scenic loop road in the South Unit of Theodore Roosevelt Na-

tional Memorial Park is scheduled for completion in 1968. This project is the last link in the construction of a 23-mile-long route linking Peaceful Valley, located some 7 miles north of Park Headquarters in Medora, with the Burning Coal Vein and Wind Canyon areas and several prairie dog towns.

Plans for the national memorial park also call for the improvement of campgrounds and picnic areas in the South Unit, installation of picnic shelters, rest rooms, and water facilities at the Painted Canyon Overlook in the South Unit, and improvement of the entrance road in the North Unit.

Plans for Fort Union Trading Post National Historic Site call for the construction of roads, trails, and utilities, as well as a visitor center, administrative structures, and an overlook which will afford visitors a view of the confluence of the Yellowstone and Missouri Rivers. Archeological excavations at the Fort Union site are also planned.

Further information about units of the National Park System in North Dakota may be obtained by writing to the Superintendent of Theodore Roosevelt National Memorial Park, Medora, N. Dak. 58645.

Bureau of Outdoor Recreation

The Department of the Interior's Bureau of Outdoor Recreation administers a program of grants-in-aid to States and their political subdivisions for outdoor recreation planning, land acquisition, and development. This program, which requires States to match available Federal dollars, was authorized by the Land and Water Conservation Fund Act of 1965.

Moneys in the Fund derive from "pay-as-you-go" user fees and entrance charges at certain Federal recreation areas, from sale of surplus Federal real property, and from Federal motorboat fuels tax. "Operation Golden Eagle," a Federal recreation fee program, promotes the sale of a $7 Golden Eagle Passport—a year-long carload entrance permit to all designated U.S. recreation fee areas. "Operation Golden Eagle" also disseminates information about the Land and Water Conservation Fund; proceeds from the sale of the Golden Eagle Passport are deposited in the Fund.

The Bureau of Outdoor Recreation does not manage any lands or recreation facilities. Its chief duties are to cooperate with the States, promote coordination in Federal programs, administer the grants-in-aid, and develop a long-range, continuing nationwide outdoor recreation plan based on State, Federal, regional, local, and private plans.

The Bureau provides technical assistance to North Dakota in preparation of a statewide recreation plan which the State must have to qualify for matching fund grants. This plan provides guidelines for future development by individuals, private organizations, cities, boroughs, and units of State government.

Additional information can be obtained from Regional Director, Mid-Continent Region, Bureau of Outdoor Recreation, Building 41, Denver Federal Center, Denver, Colo. 80225.

Bureau of Reclamation

A number of units of the Missouri River Basin Project are located in North Dakota and play a key role in the development and utilization of North Dakota's water resources. Among the first irrigation developments of the Department of the Interior's Bureau of Reclamation was the Lower Yellowstone Project along the Yellowstone River. Construction on the project began in 1905 and water was first delivered in 1909. It has become a model irrigation development of the northern Great Plains, producing seven times the crop values of a comparable adjacent dryland area.

Heart Butte Dam, located on the Heart River in Grant County, is a multi-purpose structure which was completed in 1949. Total capacity of the reservoir formed by the dam is 225,500 acre-feet, of which 69,000 acre-feet are for conservation storage which is available for the irrigation of approximately 13,000 acres of valley lands. The structure also provides major flood protection for downstream areas, including the city of Mandan. Other interests served are recreation, fish and wildlife, and water quality improvement.

Also on the Heart River is Dickinson Dam which

supplies municipal water for the nearby town of Dickinson. In addition, water in the 6,800 acre-foot reservoir is used for irrigating about 400 acres of privately developed land, for a well-developed recreational area, and for some flood control and fish and wildlife benefits. However, bentonite, carried into the reservoir by run-off from the upper part of the reservoir basin, necessitates special filtration of the water for municipal use and limits the fish capabilities of the reservoir.

Jamestown Dam and Reservoir, completed in 1954, is an integral part of the huge new Garrison Diversion Unit. Located only a half-mile north of the city of Jamestown, the dam was built principally to eliminate recurrent flood damage to the city. Total storage capacity is 227,000 acre-feet. After the Garrison Diversion Unit is developed, the Jamestown facility will act as a regulating reservoir for irrigation in downstream areas and also serve municipal and industrial requirements. Recreational facilities here are well-developed.

Reclamation also completed two small irrigation pumping projects in North Dakota. One is Fort Clark, a 2,039-acre pumping unit on the Missouri River completed in 1953. The other is the western portion of the Heart Butte Unit, completed 3 years later, serving approximately 2,500 acres with waters stored in the Heart Butte Reservoir.

The 250,000-acre initial stage of the million-acre Garrison Diversion Unit is, by far, the most important development of the Missouri River Basin Project in North Dakota. This multiple-purpose project will divert Missouri River water to northern, central, and southern parts of the State. It will provide irrigation of rich soil, as well as water for municipal and industrial purposes, recreation, fish and wildlife enhancement, pollution control, flood control, and drainage of nonirrigable land. Congress authorized the initial stage in August 1965 and construction funds were made available in 1966.

About 116,000 acres of the initial land to be irrigated in the Garrison development are in the northern part of the State. Approximately 75,000 acres are in the central part, and the remaining 59,000 acres are in the southern part of North Dakota. There are 36 major fish and wildlife areas and a number of smaller ones that will receive project water. Recreation development is proposed at nine locations, with the major areas planned around the restoration of Devils and Stump Lakes in the northeastern part of the State. Water will be supplied to 14 cities and towns and four industrial areas.

Other Missouri River Basin Project proposals in North Dakota include:

Garrison Division (Red River Basin portion) from 600,000 to 1 million acres of land, in addition to the 1,007,000-acre Garrison Diversion Unit.

North Dakota Pumping Division, 13 units for 53,000 acres of irrigable land.

Knife Division, 5,000 acres of irrigable land and other purposes.

Cannonball Division, 51,000 acres of irrigable land and other purposes.

Pembina Unit (International Joint Commission Studies), 9,700 acres of irrigable land and other purposes.

The total potential of Missouri River Basin Project developments in North Dakota is in excess of 2 million acres of irrigable land.

The Bureau of Reclamation markets power produced at Garrison Dam Powerplant on the Missouri River, north of Bismarck as well as that generated at other Federal hydroelectric powerplants in the Missouri River Basin.

In North Dakota the Bureau has constructed and now operates and maintains 1,948 miles of high-voltage transmission lines and 24 substations having a total transformer capacity of 912,800 kilovolt-amperes. This is a part of the 2,740,000-kilowatt generation and the 9,854-mile transmission line, Missouri River Basin power system.

Additional information on Reclamation investigation and development programs in North Dakota may be obtained from the Project-Manager, Missouri-Souris Projects Office, Bismarck, N. Dak. 58501; or the Regional Director, Region 6, Bureau of Reclamation, P.O. Box 2553, Billings, Mont. 59103.

Soil Conservation Service

The Soil Conservation Service of the U.S. Department of Agriculture gives technical assistance to owners of 44.5 million acres of private land in North Dakota through locally run soil conservation districts. SCS also conducts soil surveys, administers

the small watershed program and the Great Plains Conservation Program, and conducts river basin studies.

North Dakota's 70 soil conservation districts are organized and managed by landowners under State law. The districts sign working agreements with the Department of Agriculture and SCS providing for technical assistance to farmers and ranchers in planning and carrying out measures for conservation and wise use of soil, water, plant and wildlife resources.

SCS cooperates with the North Dakota State Experiment Station in making soil surveys for all counties in the State. Soil surveys are the basis for conservation planning. They also furnish useful information to highway officials, builders, contractors, and township and county governments.

SCS is authorized under Public Law 566 to carry out Federal responsibilities in North Dakota's watershed protection and flood prevention projects. Watershed projects combine local, State, and Federal efforts for flood prevention, agricultural water management, municipal and industrial water supply, and fish, wildlife, and recreation development.

River basin studies inventory all types of water resources for possible construction of multi-purpose developments that boost the economy and beautify the countryside.

Farmers and ranchers in eligible counties in North Dakota may enter into long-term conservation agreements with the Department of Agriculture under the Great Plains Conservation Program, P.L. 1021. The program provides cost sharing and technical assistance to areas of the Plains States that are subject to high winds, drought, and other climatic hazards.

Additional information about land and water resource development on private land can be obtained from the Soil Conservation Service State Office, Federal Building, P.O. Box 1458, Bismarck, N. Dak. 58501.

Office of Water Resources Research

The Water Resources Research Act of 1964 (Public Law 88–379 as amended by Public Law 89–404, April 1966), is administered by the Office of Water Resources Research (OWRR) of the Department of the Interior. It is one of the newest of the Federal-State programs dealing with natural resources. Focal point in this program is an approved water resources research center or institute in each State and Puerto Rico.

The institute at North Dakota State Universiy at Fargo is one of the 51 centers that receives annual allotments from OWRR to promote research and training in the water resources field. Funds for matching grants for the support of specific research projects submitted by these centers are available on a competitive basis. The Act also authorizes appropriation of Federal funds through matching grants, or other arrangements, to public agencies, other institutions, private industry or individuals for research on selected water problems related to the mission of the Department of the Interior.

The North Dakota Institute, although located physically at the University in Fargo, also has projects in its program which are being conducted with Public Law 88–379 support by other universities in the State. The program includes research on the limnology, chemistry, primary productivity and ecological aspects of reservoirs or lakes of the State in relation to recreation and other uses; livestock waste problems; effects of irrigation on water quality and soils; ground water problems; and water resources economics.

Students who are employed as research assistants to the well-qualified principal investigators conducting approved projects receive valuable training while performing useful research.

The institute maintains close contacts with other colleges and universities within the State having competence in water resources research and training, and keeps advised on local and State water resources research needs.

The two primary products of this program—research results and trained personnel—should be of increasing importance to effective water resources management in North Dakota.

Additional information on the activities of the Office of Water Resources Research pertaining to North Dakota may be obtained from the Acting Director, Water Resources Research Institute, North Dakota State University of Agriculture and Applied Science, Fargo, N. Dak. 58103.

The Future

Long recognized as a vital part of the wheat belt and as an important cattle-raising State, North Dakota has only begun to realize its potential for economic diversification.

Oil, uranium, salt—all were first produced rather recently in North Dakota. New uses for the abundant supply of lignite are being developed, and construction of dams and reservoirs which provide water for irrigation, as well as flood control, have made possible greater crop diversification. Recreational lands have been set aside.

North Dakotans have definite ideas about the future. The people will not sacrifice their pioneering spirit in the name of progress. Rather, they are looking forward to a future in which the basic quality of a rural society will be maintained and the benefits of growing industry will be realized.

Through the continuing efforts of State and Federal governments, supported by a sympathetic public, the conservation of natural resources will be guaranteed. With wise use, the natural resources of the Flickertail State will provide generously for both the people of North Dakota and the Nation in the years ahead.

Bureau of Land Management
Library
Bldg. 50, Denver Federal Center
Denver, CO 80225

Created in 1849, the Department of the Interior—a Department of Conservation—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

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